PRINTED FOR THE INFORMATION OF THE COURT
OF THE FISHMONGERS' COMPANY.

OYSTERS AND OTHER SHELL FISH.

REPORT

OF THE

FISHMONGERS' COMPANY,

LONDON.

DECEMBER 1902 to JUNE 1909.

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LONDON:
WATERLOW BROS. & LAYTON, LIMITED,
24 AND 25, BIRCHIN LANE, E.C.

Private and Confidential.

OYSTERS AND OTHER SHELL FISH.

REPORT of Inspections of, and Investigations into, the Oyster and other Shell Fish Layings of England and Wales, carried out by the Fishmongers' Company of London, together with the Results of the Bacterioscopic Examinations of Samples taken therefrom by Professor KLEIN, M.D., F.R.S., Bacteriologist to the Fishmongers' Company;

AND

REPORTS of Inspections of, and Enquiries in regard to, Shell Fish Layings in Scotland, Ireland, France, Holland and the United States of America, together with the Results of Bacterioscopic Examinations.

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INTRODUCTION.

THE FISHMONGERS' COMPANY, under Charter (2nd James I.), and Fisheries (Oysters, Crabs and Lobsters) Act, 1877, are the authority in the London Markets to prevent the sale of fish unfit for human consumption. From their work in connection with the maintenance of a wholesome fish food supply they have taken great interest in the questions affecting the oyster industry, especially that of contamination by sewage in its relation to disease.

On the 10th November, 1902, mayoral banquets took place at Winchester and Southampton. A large proportion of the guests was attacked by illness, many of whom afterwards developed enteric fever, and in the former case four deaths occurred. It was alleged that the oysters consumed at the banquets caused the illness, and the strongest possible presumption that such was the case was established as the result of a most exhaustive inquiry by Dr. H. Timbrell Bulstrode, Medical Inspector to the Local Government Board. It was ascertained that the oysters in both instances were supplied from the Emsworth oyster ponds owned by Mr. J. D. Foster on the date of the banquets. The Fishmongers' Company thereupon determined, in the interests of public health and of the oyster industry, to have the various oyster and shell fish layings inspected with a view to ascertain whether and to what extent, if any, they were polluted. They retained the services of Professor Klein, M.D., F.R.S., the eminent bacteriologist, to analyse and report from time to time upon the samples taken from various layings. Inspections and investigations have accordingly been made of the principal layings in England and Wales. It will be seen, from the analyses made, that many of the layings are still polluted with sewage and the shell fish thereon are unfit for human consumption. In such instances the Company have prohibited their sale in the London Markets. Local authorities have been asked to take action in all ascertained cases of serious pollution with the object of inducing them to prohibit the sale of such contaminated shell fish in their respective areas.

Many meetings have been held at Fishmongers' Hall of the principal oyster planters and merchants who have promised and given their support to the objects of the Company and have pledged themselves not to sell oysters from known polluted areas.

The sale of shell fish from polluted layings has been prohibited.

Professor Klein in his "Report of experiments and obser- "vations on the vitality of the bacillus of typhoid fever and of "sewage microbes in oysters and other shell fish" published by the Fishmongers' Company, May, 1905, has indicated the method he adopts in his bacterioscopic examinations.

A set of questions with regard to the bacilli which cause the pollution of shell fish was submitted to Professor Klein in 1904. These questions and his answers thereto are given in the Appendix (see pp. 152, 153).

ENGLAND and WALES.

BUDLE BAY, BAMBURGH.

In consequence of Professor Meek's investigations, referred to in his report to the Northumberland Sea Fisheries Committee on Mussel Culture for the year 1906, some mussels were collected from the Budle Bay Shellfish Farm, Bamburgh, Northumberland, and forwarded, by his direction on 16th October, 1907, for bacterioscopic examination. Professor Klein reported on analysis that they were not clean.

See analysis No. 348.

On 21st May, 1908, a further sample of mussels was taken from Budle Bay Fish Farm, forwarded to the Company by the request of Professor Meek, and submitted to Professor Klein for analysis, who reported that the sample was not sufficiently fresh and not very suitable, several of the mussels were dead, but that out of eight mussels five had b. coli com., of four specially examined none had enteritidis spores.

See analysis No. 368.

CLEETHORPES.

The oyster layings are situate at the end of the pier, and extend in an easterly direction. The layings are about a mile long and three-quarters of a mile in breadth. The top (northern) layings are not at present in use. The surface of the layings presents to the eye a cleanly appearance.

These layings are almost entirely used for the relaying of American, Dutch and Deep Sea oysters, and are mostly deposited on the grounds for summer trade during the months of April, May, June and July. The layings are ordinarily

covered at high water by about 20 feet of water. They are primarily exposed to pollution in the following ways :—

(*a*) There is a sewer outfall about three-quarters of a mile distant from the eastern limits of the layings. The outfall was inspected at low water, when it was seen to be discharging freely. There was a pool of crude sewage in a hollow at its mouth, and the overflow was running along a sewage-formed creek in a westerly direction, *i.e.* in the direction of the layings. This sewer serves (normally) about 5,000 persons.

(*b*) The second sewer outfall is situate about a mile and three-quarters to the west of the pier and layings. On inspection at low water it presented a much more loathsome appearance than the former, there being a lake of crude sewage (which was being freely added to), the surface of which was covered with human fœcal matter. This sewer (normally) serves about 11,000 persons.

(*c*) About a quarter of a mile further up the river from the second outfall is the main sewer outfall of Grimsby, and a little further up is a second overflow sewer outflow in connection with Grimsby. The main sewer is prevented from continuously discharging its contents by the incoming tide, and it is therefore during that time shut off by means of a pinstock. In the interval the sewage is discharged into a well, from which it is pumped into the River Humber.

The waters of the Humber at all states of the tides receive the sewage of Grimsby, the population of which is estimated at about 65,000.

In addition to the normal population of Cleethorpes, during the summer months there are, on an average, some 2,000 visitors, besides excursionists. The influx of excursionists is estimated on some days to reach the large number of upwards of 30,000.

In view of the immense trade, especially at the retail shops, in oysters at Cleethorpes and the extreme doubtfulness of the suitability of the layings as a place for relaying oysters for direct consumption, samples were taken from different parts of the layings on 24th August, 1903 (1) four of American, (2) one of Deep Seas, (3) one of Dutch Natives.

The analyses showed the oysters were seriously contaminated. See analyses Nos 132, 133, 134, 135, 136, 137.

Messrs. R. and S. Osborne, one of the principal firms in the oyster trade of Cleethorpes, were found to have constructed a pit on the beach to the west of the Pier, for the storage of oysters, but on inspection (24th August, 1903) it was found not in use, and stated to be only utilized for wintering purposes.

On the 29th September, 1903, the Company's Inspector again visited Cleethorpes, and found that Messrs. Osborne were using the pit before referred to for storing oysters. He made a purchase of half a hundred, which were submitted for analysis and found to be polluted. Mr. R. Osborne was seen, when he informed the Company's Inspector that he and his brother had decided to abandon the pit. See analysis No. 151.

Upon a close examination of the pit in question it was found to be supplied with water by means of iron pipes taken on to the foreshore in a diagonal direction, and the intake was situate at a distance of some two hundred yards from it, and within a mile from the Cleethorpes main sewer outfall, above which (within a quarter of a mile) is the main sewer outfall of Grimsby before referred to.

The sale of Cleethorpes oysters was prohibited in the London markets, and the layings have been closed.

At the request of Lord Yarborough samples of Blue Points were taken on 22nd October, 1906, from Mr. S. Osborne's beds, which were covered by two or three feet of water, and submitted to Professor Klein for analysis. Both samples were covered with black slimy matter—on opening many of them had black mud inside. See analyses Nos. 303, 304.

Professor Klein found them unclean and strongly polluted.

These samples were taken to ascertain whether the oysters then remaining on the beds were still polluted.

BOSTON.

See analyses Nos. 305, 306, 307, 308.

The Boston Deep Sea Fishing and Ice Company forwarded on the 19th October, 1906, four samples of water to the Company, taken at full ebb from different parts of their layings for analysis. The samples were submitted to Professor Klein, who reported that none of these waters could be considered objectionable.

See analysis No. 313.

On 2nd November, 1906, the Boston Deep Sea Fishing Company's oyster layings, comprising an area of about 30 acres, situate on Herring Hill, the southern extremity being about 1,000 yards from Cut End, and to the east thereof, were visited. The distance from the layings to the town of Boston by water is about five miles. It was ascertained that the sewage of Boston is discharged at points ranging from the Docks upwards into the River (New Cut). The River Witham runs into the New Cut at Boston. Assuming that the solid and liquid sewage of the population of, say, 16,000 finds its way into the New Cut, thence to the Wash, it follows, notwithstanding the distance from the Wash to Boston, that the vicinity of the entrance to the New Cut is not an ideal one. Black Buoy Sand was also inspected, which is parallel with Herring Hill, upon which there are important cockle and mussel beds, which can be no doubt exposed to pollution. A sample of oysters was taken from the oyster grounds on 2nd November, 1906, situate in the Wash, at a distance of about 1,000 yards from the entrance of the New Cut and to the east of it. The oysters had been relaid for periods varying from three to ten weeks, and submitted to Professor Klein, who reported in the result "oysters not clean."

On 19th December, 1906, a sample of oysters was received from the Boston Deep Sea Fishery and Ice Company, taken from their layings, and submitted to Professor Klein for analysis, who found in the result "oysters decidedly unclean." See analysis No. 318.

RIVER ORWELL, IPSWICH.

The oyster layings owned by Mr. Horace L. Cooke are situate at the "Lower Reach" of the River Orwell, about eight miles from Ipswich, and extend for about a mile and a half to two miles.

The sewage of Ipswich is discharged into the river. The outfall is about one and three-quarter miles from the town, and is on the eastern bank of the river. It was found in 1903 that the sewage was not treated in any way. During the flood-tide it was stored in tanks which were contiguous to the outfall, and was discharged on the ebb and flow of the tides.

Nearly the whole of the Ipswich sewage is thus disposed of. The population of the town is computed to be 70,000.

Two samples of oysters, "Natives," were taken on 26th August, 1903, viz., one from the layings off Shotley Point and the other from opposite Crane's Hill. On analysis they were both found to be polluted. See analyses Nos. 138 and 139.

The sale of oysters from the layings in this river was prohibited in the London markets.

On the 24th November, 1904, the Company's Inspector again visited Ipswich, and it was ascertained that in the previous year there had been an epidemic of typhoid, and the cause was attributed to the consumption of cockles taken from the River Orwell. In consequence the Health Authority issued notices cautioning the public against taking cockles from the lower reach of the River Orwell, and in addition hired fishermen to gather the cockles, and had them destroyed.

On 29th November, 1904, the Company's Inspector took from the River Orwell, at a point a little higher than, and on

See analysis No. 229.

the opposite side of, the Ipswich sewage outfall, samples of cockles and mud, which were submitted to Professor Klein for analysis, who found the cockles were polluted and the mud distinctly and grossly polluted with sewage.

See analyses Nos. 231 and 232.

On the 22nd December, 1904, two samples of water were taken, on the ebb tide, from the River Orwell, near Harwich, as follow:—(*a*) At a point opposite Shotley Marshes; (*b*) from the east point of Colliper.

The above samples were submitted to Professor Klein, who reported that neither of these waters could be considered as being polluted with sewage.

On the 29th January, 1908, the Company's Inspector visited the sewage works at Ipswich, and upon inspection he found the sewage was then screened, and he was informed by the manager that they took out of the tanks about 3,500 tons of sludge per annum. This would bring about a considerable improvement upon the old system of discharging everything into this river; but nevertheless it would be highly desirable, until the sewage was either chemically or bacterially treated, that a system of screening the sewage more finely should be installed, in lieu of the present crude method.

See analyses Nos. 363 and 364.

The Company's Inspector, in the company of Mr. Horace Cook and Mr. Edwin Cook, took two samples of oysters; one out of a pit where it was stated the oysters had been relaid for some months—the pit in question being one among a group of pits situate on the Saltings, opposite Shotley, and on the Shotley side of the river—and the other from the river, in about six fathoms of water, at a point opposite Shotley Church.

These two samples were submitted to Professor Klein, who found that they were both unclean.

See analyses Nos. 380 and 381.

On 12th October, 1908, a sample of Native oysters was taken out of the "Legion," situate on the foreshore of the River Orwell, by Shotley, in the occupation of Mr. H. L. Cook, stated to have been in the said "Legion" for over a week, together with a sample of water taken out of the same Legion at 10 a.m. It was ascertained the water commenced to flow

into the "Legion" at 9 a.m., and it was high water at Shotley at about 11.30 a.m.

The two samples were submitted to Professor Klein, who found that the oysters were quite clean, and the water, as surface water. was quite satisfactory. It was thereupon decided to allow Mr. H L. Cook to place his oysters from the Orwell layings upon the market, provided he relaid them in the "Legion" for a week.

ORWELL HAVEN.

Messrs. Baxter & Son proposed to take over for a winkle fishery a stretch of grounds close to the entrance of the Orwell River, extending from near the Pier Hotel to Fagbury Cliffs in the Orwell Haven, and at their request the Company's Inspector was sent down to inspect. He found that to the south of the Pier was the sewage outfall of Walton and Felixstowe, the sewage being discharged at all times of the tide; and that on the opposite side of Harwich Harbour, near Port Beacon, was the sewage outfall of Harwich and Dovercourt, which only discharged at high water, and, as the crude sewage of Ipswich was also discharged into the River Orwell, the Company were unable to recommend the proposed laying for shell fish.

On 21st October, 1906, samples of mussels and water were taken by the Company's Inspector from Orwell Haven grounds, the water being taken just below low water mark, and submitted to Professor Klein for analysis, who reported that the mussels were distinctly not clean, and the water was doubtfully clean.

See analyses Nos. 301 and 302.

BRIGHTLINGSEA.

Since Dr. Bulstrode reported on his inspection of the oyster layings at Brightlingsea, a new system of drainage has been in operation, by which it is maintained that the purity of the extensive oyster layings has been ensured.

There were, early in the year 1903, a number of pits, called "legions," in which oysters were stored, boarded round with old timber on either side of the road or "Hard" leading to the Ferry. The pits, being located near high-water mark, were not sufficiently washed by tidal waters to ensure that degree of purity that is essential, and were liable to local contamination. Representations were made to the occupiers of the pits of the liability to contamination, and suggestions made that they should be either rebuilt on modern and sanitary principles or absolutely closed. The owners adopted the latter suggestion, and closed the pits.

See analyses Nos. 43 and 44.

After inspections of Brightlingsea Creek and the layings, two samples of oysters ("Natives" and "Portuguese") were taken on the 2nd January and 3rd February, 1903.

The "Natives" on analysis were found not to be polluted, but the "Portuguese" polluted to the extent of about 25 per cent.

St. Osyth Channel.

See analysis No. 61.

A sample of American relaid oysters taken from Messrs. Musson & Co.'s layings in the channel were on analysis pronounced as not polluted.

Brightlingsea Creek.

See analysis No. 80.

On the 19th February, 1903, a sample of Portuguese oysters taken from Mr. Tabor's shop in Lower Thames Street, and stated to have been imported from Ile de Ré, and relaid at Brightlingsea for about 12 months, were dredged, submitted to bacteriological examination, and found to be "not polluted, clean."

WIVENHOE. RIVER COLNE.

At Wivenhoe there are no oyster layings, but two pits in the River Colne used for the storage of oysters by Mr. J. Heath and Mr. Wm. Bartlett.

Mr. J. Heath's pit, called "Fingringhoe Pit," and located on the opposite side of the river to the Wivenhoe sewer outfalls, appeared to be free from pollution when the Company's Inspectors visited the locality on the 2nd February, 1903, a sample of oysters being then taken from this pit, submitted to Professor Klein for analysis, and found to be not polluted. See analysis No. 42.

The pit used by Mr. Wm. Bartlett, located on the Wivenhoe side of the river, had sewage outfall on either side, and other nuisances in close proximity to it. Dr. Pender Smith, the Medical Officer of Health for Wivenhoe, inspected the pit with the Company's Inspectors, and noticed at its entrance a hamper of Portuguese oysters under water. The Medical Officer stated that he had strictly cautioned Bartlett against making use of the pit for storing purposes. Dr. Bulstrode had also condemned the pit and personally warned Bartlett, and the Medical Officer of Health for Essex subsequently condemned it.

The Company's Inspector made a purchase of oysters from the hamper, and submitted them to Professor Klein for analysis, who reported they were strongly polluted. See analysis No. 41.

A purchase was also made of some Natives, which were not in the water, but taken from a shed near the pit, which on analysis were found not polluted. See analysis No. 40.

The Company, looking to the fact that Mr. Bartlett had wilfully persisted in using a foul pit for the storage of oysters, reported the matter to the Wivenhoe Urban District Council, suggested that proceedings should be taken under the Public Health Acts, and specially sent down a representative to lay the facts before the Council.

The Council, in consequence, directed their Solicitor to take proceedings, and accordingly Mr. W. Bartlett was summoned to appear before the Justices at Colchester. Before the hearing of the summons, Mr. Bartlett consented to close the pit and pay the costs, to which arrangement the Council agreed and allowed the summons to be withdrawn.

The Company called the Local Government Board's attention to the circumstances, and the Board expressed the opinion that

the Council had taken upon themselves a very serious responsibility in withdrawing the proceedings, and their action was not calculated to inspire the public with confidence in them as a body responsible for the administration in their district of the law relating to public health.

See analyses Nos. 332, 333.

In consequence of having received information that oysters were being placed in hampers and kept close to the pit which had been closed, and that there had been cases of illness after partaking of oysters in Wivenhoe, the Company, on the 8th of August, 1907, sent their Inspector to Wivenhoe, who called upon Mr. William Bartlett, whose yard adjoined the pit, when he noticed some hampers of oysters and a bag on the edge of the water of the River Colne, and made a purchase of half a hundred of Portuguese oysters. The Company's Inspector reported the matter to Dr. Pender Smith, the Medical Officer of Health at Wivenhoe, and returned to London with the oysters he had purchased, and handed them on to Professor Klein for analysis. It was found the oysters were distinctly sewage polluted and unfit for food.

On Saturday, 10th August, 1907, the Company received from Professor Klein his certificate to the above effect, whereupon the Company's Inspector was directed to proceed to Wivenhoe with the remainder of the oysters he had purchased, and Dr. Pender Smith, at his request, formally seized the oysters, and subsequently obtained a Magistrate's Order for their destruction.

See analysis No. 334.

Professor Klein on the 12th August received from the Company's Inspector a sample of water at Wivenhoe, which upon analysis was found to be ordinary average sewage. Dr. Pender Smith reported the matter to his Council, who at a special meeting, passed a resolution instructing their Solicitor to take proceedings against Mr. Wm. Bartlett.

Proceedings were accordingly taken at the instance of Dr. Pender Smith, the Medical Officer of Health for Wivenhoe.

Evidence was submitted by Professor Klein, Dr. Pender Smith and the Company's Inspector. Mr. Bartlett stated the oysters in question were taken from his laying at Tollesbury, and in the result the Bench convicted Bartlett, and imposed a penalty of £20, together with £5 19s. 9d. costs.

THE BLACKWATER (TOLLESBURY AND MERSEA FLEETS) LAYINGS.

In the Blackwater there are very extensive oyster layings, in the occupation of the Tollesbury and Mersea (Blackwater) Fishery Company.

The Tollesbury and Mersea Fleets layings are let to and occupied by different oyster merchants.

The Mersea Fleet layings are situated between Packing Marsh Island and Cobmarsh Island. At Cobmarsh Island are pits used for wintering purposes. On the foreshore near Stonehill Hard are storage pits.

Salcot Channel and Little Ditch, the North Channel and Tollesbury Fleet contain numerous layings, and in the South Channel of Tollesbury Fleet are layings as far inland as the mouth of Woodrolfe Creek.

The sewerage system at Tollesbury has been reformed, and the sewage, instead of passing into the Marsh creeks in a crude state, is passed through a septic tank and coke bed before being discharged into the said creeks. There is, therefore, little danger of the clarified effluent having any deleterious effect upon the oyster layings in the North and South Channel.

On the 19th February, 1903, Mr. W. J. Bean forwarded for analysis eight samples of oysters (two oysters to each sample), and numbered 1 to 8 respectively, consisting of—

(1) Natives, taken from Cobmarsh pit,
(2) Brittany oysters,
(3) Portuguese oysters, and
(4) Natives, all taken from the south end of Fleet layings.
(5) Portuguese, taken from mid-channel, north layings.
(6) Brittany oysters, taken from a pit near the north layings.
(7) Natives, taken from the Home pits, and
(8) Natives, taken from the north layings.

See analyses Nos. 70 to 77.

The above samples were stated to have been taken out of the beds on the 17th February, 1903, and were all found to be on examination free from any pollution and remarkably clean.

The various layings were inspected on the 4th and 5th May, 1903, when it did not appear from the surroundings that there was any danger of sewage pollution, which corroborated the results of the analyses of the further samples of oysters and water taken on those dates, viz.:—

See analyses Nos. 107 to 116.

(1) Portuguese oysters and water taken from the upper portion of north layings.

(2) Portuguese and Native oysters from the southern and Mersea Fleet layings.

(3) Native oysters, Mr. Edwin Cooke's layings, from the middle of Salcot Creek.

(4) Native oysters, from two points of the layings belonging to the Tollesbury and Mersea (Blackwater) Fishery Company, called Deep and South Shore respectively.

(5) Native oysters, Mr. Mussett's layings, about the middle of "Ditch" layings.

(6) Native oysters, Mr. Chatterton's layings at Tollesbury, from South Channel, Woodrolfe Creek end.

(7) Natives, about the middle of the North Channel.

(8) A sample of water taken at the extreme end of the layings in South Channel and close to entrance of Woodrolfe Creek.

All of which were found to be practically free from any contamination.

PYEFLEET CREEK, COLCHESTER.

See analyses Nos. 87 and 88.

The Pyefleet oyster layings, which are about one mile in extent, are in the occupation of the Colne Oyster Fishery Company, and are principally used for the fattening of their oysters. The district is practically uninhabited, and there are apparently no drains which discharge into the Pyefleet.

The sewage of Colchester is treated chemically, and owing to tidal sets there is little or no liability of any of the effluent being carried to the Pyefleet, which is situate some six miles from Colchester.

On 3rd March, 1903, "Natives" were dredged at four different parts of the Pyefleet, and a sample was analysed, together with a sample of water taken at a point opposite Pewit Island. The analyses of the oysters and water showed no pollution.

On Pewit Island there are upwards of 50 pits used by the Colne Oyster Fishery Company for storage of oysters during the winter. The sanitary conditions are most satisfactory.

The Corporation of Colchester, since the 24th of June, 1903, have treated their sewage on a larger and more elaborate scale.

BURNHAM.

On 9th December, 1903, the Company's Inspector made a purchase of one dozen "Burnham Natives" at the shop of Messrs. Sweeting & Co., No. 159, Cheapside, E.C., which had been received by that firm that morning from the Burnham Oyster Company. See analysis No. 182.

The above sample was submitted to Professor Klein for analysis, and was found not to be polluted.

SOUTHEND-ON-SEA.

On the 19th October, 1903, a sample of cockles relaid at West Shoebury, near Southend, and cooked, was purchased from a man named Cundy, at Billingsgate Market, by the Company's Inspector, at the request of Dr. Collingridge, Medical Officer of Health for the City of London, who submitted them for analysis to Professor Klein. They were found to be polluted, and on the 21st October, 1903, notice was given

to Cundy prohibiting the sale of cockles from West Shoebury in the London markets.

See analysis No. 161.

On the 21st of October, 1903, a sample of cooked cockles, which had been relaid, was submitted to Professor Klein for analysis. They were stated to have been taken from the foreshore, opposite the "Halfway House," at Southend-on-Sea, in the previous June. These were found to be polluted, and could not have been boiled for five minutes, as stated by Mr. A. Cotgrove, of the Cockle Syndicate. On the 22nd October, 1903, the sale of cockles from Southend was absolutely prohibited in the London markets, the situation where they were obtained being utterly unfit for the relaying of shellfish.

See analysis No. 164.

On the 23rd October, 1903, a sample of cockles taken from the foreshore opposite "Halfway House," at Southend, was cooked by steam for six minutes, and submitted to Professor Klein for analysis, who found that the cockles were free from any pollution.

See analysis No. 224.

On the 12th October, 1904, the Company's Inspector purchased some mussels from a fisherman named David William Cnndy, from a boat off Southend Pier, which had been gathered by him from the end of the old pier. A sample of these mussels was submitted for analysis to Professor Klein, who reported they were strongly polluted.

Proceedings were afterwards instituted against Cundy, and he was convicted for selling mussels unfit for human food.

See analysis No. 297.

A sample of winkles, gathered from Messrs. Baxter's Southchurch shell fishery, was submitted to Professor Klein for analysis on the 5th of September, 1906, who found the winkles unclean.

See analyses Nos. 298, 299.

Messrs. Baxter & Son forwarded two samples of winkles on 5th October, 1907, to be analysed, viz.: No. 298, live winkles taken on that date from Southend Corporation grounds, west of Pier, Southend; No. 299 taken from the same place on the same date as No. 298, put in boiling water, and after the water had again reached boiling point allowed to boil for

90 seconds. They were submitted to Professor Klein, who found No. 298 heavily polluted, and No. 299 free of sewage organisms.

The Company submitted to Professor Klein on 25th November, 1907, a parcel of mussels, 58 in number, which had been gathered about 200 yards off the shore at Westcliff, Southend-on-Sea, there being no doubt as to their polluted condition. These were taken for experimental purposes with a view to ascertaining their power to cleanse themselves of b. coli communis when placed in clean sea water. See analysis No. 356.

On the 3rd December, Professor Klein reported as follows :—

"These mussels arrived in fresh and good condition, their "shells tightly closed. After washing them well in a basin of "sea water, supplied by the Great Eastern Railway Company, "from Lowestoft, they were placed, except six, in a clean tank, "and 3,000 c.c. of clean, practically sterile, sea water were "poured over them. After about six hours the water was "poured off and the mussels remained in the tank over-night. "Next morning a fresh supply of clean sea water, 3,000 c.c., "was again poured over them, and this was poured off after "six hours. In this way the mussels were kept for a week, "always supplying them in the morning with 3,000 c.c. of "clean sea water and pouring this again off after six hours. "With the exception of a few, not more than 8 or 10, all the "others were active and lively. (There are to-day still 24 "mussels left, all in a perfectly sound and active condition, "24 of the original number having been used for other "experiments.)

"I mentioned above that six mussels after arrival and "cleaning of the shells on the outside were not subjected to "the experimental cleansing process. These six mussels were "opened, the liquor drained off as much as possible, the bodies "cut out and minced in a sterile dish. The fluid oozing out "of the minced bodies amounted to about 6 c.c., *i.e.* 1 c.c. per "mussel. This fluid was analysed by using $\frac{1}{4}$ c.c. (of the fluid) "for a large Drigalski plate. The result was :—that there "developed on this plate 36 colonies of b. coli communis, or, in Experiment 1.

" other words, the control mussels contained at starting, b. coli " communis to the number of 144 per mussel. This is not " to be wondered at considering the locality from which the " mussels were derived.

Experiment 2.

" After the experimental mussels had been supplied with " clean sea water for two successive days, six were subjected to " exactly the same method of analysis as the control mussels, " viz.: six mussels were opened, well drained, the bodies re- " moved and minced. Total amount of fluid of the mince " about 6 c.c., with ¼ c.c. made one large Drigalski plate. As " a result it was found that not only was there a conspicuous " diminution of colonies in general, but that only three colonies " of b. coli communis developed in the plate, that is to say, " the number of b. coli communis per mussel had during the " two days' change decreased from 144 to 12 per mussel.

Experiment 3.

" After the lapse of two further days, that is, after four " days' treatment with clean sea water, six further mussels " were analysed in precisely the same way as above. The result " was that no colonies of b. coli communis developed in the " Drigalski plate, in other words, the mussels had quite got rid " of the polluting b. coli communis.

Experiment 4.

" To confirm this result, after a lapse of two further days, *i.e.* " six days after treatment, six further mussels were analysed as " above. As a result no colonies of b. coli communis developed " in the plate, nor were there any appreciable number of other " microbes present—two colonies in all of some other microbes.

" Tabulating the above results, we see:—

" Fresh mussels from West- " cliff-on-Sea	144	b. coli communis per mussel.
" Mussels treated for two " days with clean sea " water...	12	" " "
" Mussels treated for four " days with clean sea " water	0	" " "
" Mussels treated for six " days with clean sea " water	0	" " "

"There can, then, be no doubt (1) that the b. coli communis "is foreign to the mussel, and (2) that it rapidly disappears "from the mussel, if the latter is supplied with clean sea "water, daily changed. Mussels in this respect cleanse them- "selves even more rapidly than oysters (see my report on "Vitality of B. Typhosus, &c.), and for the reason, I presume, "that mussels can take up relatively more sea water and can "hold within their shell more sea water than oysters, the "volume of the body of the mussel being smaller than the "body of the oyster as compared with the volume of the shells. "Although under natural conditions such a rapid cleansing as "in the above experiments cannot be expected, since mussels "are always found near the shore, and since such clean sea "water as was used in the above experiments can hardly "be available by an incoming tide near our shores, yet it "is feasible to assume that a cleansing process, if slower, "would ensue, provided that the mussels are removed from a "locality in which they are constantly being supplied with "fresh pollution."

On the 28th May, 1909, the Company's Inspector purchased from the Southend Shell Fish Company, at their shed situate on the foreshore in close proximity to the Halfway House, at Southend-on-Sea, some cooked cockles, a sample of which was submitted to Professor Klein, who reported the cockles were distinctly polluted and insufficiently cooked. The Company at once officially notified the matter to the Medical Officer of Health for Southend, Dr. Grant Pugh, who afterwards informed the Company's Inspector, on the 7th June, that the matter would be reported to the next meeting of the Health Committee; in reply to a letter from Dr. Grant Pugh, he was informed the Fishmongers' Company could not permit the sale of any cockles taken from a grossly polluted source such as the foreshore of Southend was known to be.

See analysis No. 417.

LEIGH-ON-SEA.

COCKLES.

In December, 1902, it was found the cocklers at Leigh-on-Sea had been for some years in the habit of taking cockles from the Blythe and Maplin Sands and other places situated in the Thames estuary, and relaying them in Leigh Creek, at Leigh-on-Sea, for two or three days, and afterwards taking them up for market purposes and boiling them.

See analyses Nos. 2a and 2b.

Samples of cooked cockles which had been relaid in Leigh Creek were taken in December, 1902, by one of the Sanitary Inspectors of the Corporation of the City of London, from one of the cockle vendors who was selling them outside Billingsgate Market. The samples were found upon examination by Professor Klein to show evidence of sewage pollution.

On the 23rd December, 1902, the Company sent down one of their officers to Leigh-on-Sea, to inform the cocklers that in consequence of the cooked cockles having been found to be contaminated with sewage, and the Company being satisfied that Leigh Creek was not safe for the relaying of cockles, they would be compelled to seize any cockles coming to Billingsgate Market which had been relaid in Leigh Creek, and at their request the Company's officer called upon Dr. Watson, the Medical Officer of Health for Leigh, accompanied by Charles Palmer, a cockler, when Dr. Watson stated that as Dr. Thresh, the Medical Officer of Health for the County of Essex, was prosecuting an exhaustive enquiry relative to this question, he felt he was not required to make any recommendation to the Council until after Dr. Thresh had concluded his enquiry.

It was ascertained that since Dr. Bulstrode's visit to Leigh Creek, referred to in his report to the Local Government Board in 1896, the cocklers had not used creek water for cooking the cockles, but were using ordinary drinking water, and this practice has been continued.

See analysis No. 4.

The Company also caused samples of cockles to be obtained direct from the Blythe and Maplin Sands on the 31st of December, 1902, and 1st January, 1903, respectively, and

submitted them in their shells (uncooked) to Professor Klein for analysis, and these were found to be polluted.

On the 17th January, 1903, the Company submitted to Professor Klein two samples of cockles which had been taken direct from the Maplin Sands, and boiled respectively for three and a half minutes and one minute, with the result that three and a half minutes' boiling had effectually sterilized the interior of the cockles, and one minute's boiling was not effective. As a result of these analyses the cocklers were informed that only cockles gathered from pure native beds and boiled for three and a half minutes could be allowed to be sold. See analyses Nos. 22 and 23.

The cocklers in reply stated that to boil the cockles for three and a half minutes would render them unfit for sale. On the 20th January, 1903, seven samples of cockles were taken by the Company's Inspector at Leigh after they were boiled from one minute to three and three-quarter minutes, with the exception of one sample (No. 28), which was uncooked. The boilers in which the cockles had been cooked contained eight to ten gallons of water; about two gallons of cockles at a time were put into the boiling water. See analyses Nos. 24 to 30.

These samples were submitted to Professor Klein; three out of the seven were found to be polluted, and the remainder were found to be free from pollution; three and a half minutes boiling having produced a negative result.

On 28th February, 1903, a sample of cooked cockles was taken from Mr. Palmer, at Billingsgate Market, which were on sale, and submitted to Professor Klein for analysis, who found no b. coli in any of the 16 cockles examined. See analysis No. 86.

On the 22nd of May, 1903, the Company's Inspector again visited Leigh-on-Sea, and satisfied himself that cockles were being relaid in the creek before boiling, and he called the attention of the cocklers to the fact, when one of the men (Robert Deal) stated they were placing the cockles into the creek, and intended to do so, and that Dr. Watson, the Medical Officer of Health, was aware of it, and that gentleman had only that morning taken a sample of the water.

See analyses Nos. 123, 124 and 125.

On this occasion the officer made three purchases of cooked cockles, which were afterwards submitted for analysis and found to be polluted.

On the 29th May, 1903, the Company wrote to the Clerk of the Leigh Urban District Council, with full particulars and results of the analysis, and requesting that their Medical Officer of Health should take proceedings under the Public Health Act. The letter was handed to Dr. Watson, but that gentleman declined to interfere in the matter.

On the 6th of June, 1903, several seizures of cooked cockles were made by the Company's officers in the vicinity of Billingsgate Market, which were exposed for sale by the various Leigh cocklers.

On the 10th of July, 1903, the Company's officer was at Leigh, and it was ascertained that quantities of cockles were being relaid on the foreshore at Southend, midway between Southend and Shoeburyness.

In consequence of the Company ascertaining that cockles which were believed to have been taken from Leigh Creek and were unfit for food were being sold in Gravesend by A. Ford, cockler, of Leigh, the Company informed the Medical Officer of Health at Gravesend.

See analysis No. 152.

On the 3rd October, 1903, Inspector Luke, Sanitary Inspector at Gravesend, purchased from Ford some of the suspected cockles, which he was then selling to the public there. The cockles were forwarded to the Company, who submitted them to Professor Klein, and he reported they were grossly polluted.

Unfortunately, owing to a technicality, no proceedings were taken by the local authority against Ford, but he was cautioned, and promised not to repeat the offence.

On 10th October, 1903, Dr. Collingridge, Medical Officer of Health for the City of London, submitted three samples of cockles to Professor Klein for analyses, which had been taken from three of the Leigh cocklers at Billingsgate Market. Each sample was found to be polluted with sewage.

On the 27th October, 1903, certain cockles and mussels were cooked by steam at Fishmongers' Hall, as an experiment, in the presence of Professor Klein, samples of which were afterwards forwarded for analysis to him, and he found that the cockles were free from any growth, but portions of the mussels failed to sterilize, and it was consequently decided to make further experiments. See analysis No. 167.

On 12th November, 1903, three samples of cooked cockles were submitted to Professor Klein for analysis, viz., (1) Cockles washed out with boiling water two and a half minutes, then steamed for two and a half minutes at 10 lbs. pressure; (2) cockles steamed only for five minutes at 10 lbs. pressure; (3) cockles steamed only two and a half minutes at 60 lbs. pressure. Professor Klein reported (1) out of eight cockles two contained b. coli, one other cockle some coli-like microbe; (2) sterilised for b. coli and all non-sporing bacilli; (3) sterilised for coli-like microbes, but not for some cocci and spores. See analyses Nos. 170, 171 and 172.

On the 26th November, 1903, four further samples of mussels were cooked by steam at Fishmongers' Hall, in the presence of Professor Klein, for three and four minutes, which were afterwards forwarded to him for analysis, and found to be sterile with respect to sewage organisms. See analyses Nos. 175, 176, 177 and 178.

The Company advised the cocklers to cook their cockles by steam sufficiently to sterilise them, instead of boiling them, which the men agreed to do in January, 1904.

On the 27th May, 1905, a sample of cooked cockles was obtained from a Mr. Robinson (a Leigh cockler), at Billingsgate Market, which was stated to have been steamed in an oven for five minutes, having been previously taken off Sheppey Island (Whitstable side), and relaid for a short time in Leigh Creek. Another sample was also obtained on the same day from a Mr. Livermore (a Leigh cockler), which was stated to have been steamed in a retort for five minutes, having also been previously taken off Sheppey Island, and relaid for a short time in Leigh Creek.

The above samples were submitted to Professor Klein for analysis, who reported that they were both polluted. If the See analyses Nos. 236 and 237.

process of cooking the cockles by steam had been properly carried out, they should have contained no microbes of the coli-like type, or of streptococci in a living state.

On the 26th August, 1905, samples of cooked cockles were obtained from Archibald Young and Alfred Young (Leigh cocklers), at Billingsgate Market, which were stated to have been taken from Laysdown Flats, Whitstable, and relaid in Leigh Creek for a couple of hours, and steamed in a retort for five minutes. Samples of cooked cockles were also obtained from D. Going and Richard Harvey (Leigh cocklers). Going's cockles were said to have been taken from the Main Channel alongside the Racing Channel, four miles below Burnham, and relaid in Leigh Creek for 24 hours, and steamed in an oven for five minutes. Harvey's cockles were stated to have been taken from Laysdown Flats, Whitstable, relaid in Leigh Creek for two days, and steamed for five minutes.

See analyses Nos. 238 and 239.

The above samples were submitted to Professor Klein for analysis, who found they were all polluted.

On the 22nd September, 1905, the Company's Inspector went down to Leigh-on-Sea, and was present when a quantity of cockles were taken out of Leigh Creek, where they had been relaid for four days. These cockles were prepared for cooking in two ways, viz.: (A) By being placed on a tray, put into an oven and steamed for five minutes at a pressure of 10 lb.; (B) By being placed in two baskets, containing about $2\frac{1}{2}$ gallons each, in a retort and steamed for five minutes at a pressure of over 10 lb.

The above cockles were cooked in the same manner as the fishermen asserted they always prepared their cockles.

See analyses Nos. 240 and 41.

A sample of each of the above-mentioned cooked cockles was submitted to Professor Klein for analysis, who found that neither coli bacilli nor streptococci were present in a living state—in fact the culture tubes remained sterile.

On 18th November, 1905, a sample of cooked cockles was obtained from Theodore Meddle (a Leigh cockler), at Billingsgate Market, which was stated to have been taken direct from

the "Mush," Leigh-on-Sea, and the "Main," Burnham-on-Crouch, and had been cooked by steam in ovens for five minutes, under a pressure of 20 lb.

This sample was handed to Professor Klein for analysis, and was found to be polluted, and therefore had not been sufficiently steamed. See analysis No. 246.

On 9th December, 1905, a sample of cooked cockles was obtained from D. Going (Leigh cockler), at Billingsgate Market, which was stated to have been taken direct from the "Main," six miles below Burnham-on-Crouch, and had been cooked on trays in an oven for five minutes.

This sample was handed to Professor Klein for analysis, and was found to be polluted. See analysis No. 247.

On 20th June, 1906, Inspector Bannington, West Ham, called at Billingsgate Market, with reference to a number of cases of typhoid and enteric in his district, alleged to have arisen through eating cockles from Leigh. It was ascertained on enquiry that five of the patients had partaken of cooked cockles obtained from a dealer in the Barking Road, Canning Town, who had received them from a Leigh fisherman in a hamper marked "J. O." (J. Osborne), one of the cocklers at Leigh who cooks his cockles by steam.

On the same day a sample of cooked cockles was taken from a hamper sent to Mr. Plumb, Billingsgate Market, by Meddle, a Leigh fisherman, the cockles having been cooked by steam. See analysis No. 261.

The above sample was submitted to Professor Klein for analysis, who found that five out of eight cockles contained b. coli and coli-like bacilli. They could not, therefore, have been sufficiently heated, and could not on that account be pronounced safe for consumption.

Leigh-on-Sea was again visited on 22nd June, 1906. The cocklers were found placing the cockles in Leigh Creek behind their huts, where they became covered by the top of the tide at high water. On the following day the cocklers at Billingsgate Market were seen by the Company's Inspector, when they admitted having placed the cockles in the creek, and some cockles

were purchased from Harvey and Going (both Leigh cocklers), who used steamers for preparing their cockles for market. They were submitted to Professor Klein for analysis, who reported that the cockles had not been sufficiently heated to destroy the sewage bacilli. On the 28th June, 1906, a telegram was sent to the Rev. Stuart King, Leigh, who had interested himself on behalf of the cocklers, asking him to warn the men against putting cockles in the creek, and also to thoroughly cook them.

See analyses Nos. 262 and 263.

On the 30th June, 1906, a sample of cooked cockles was taken out of a "pad" at Billingsgate Market, belonging to Axcell, a Leigh fisherman, who stated the cockles had been gathered from the Maplin Sands, thence brought to Leigh, where they were taken direct from the boat to the shed, and then cooked by steam for five minutes.

See analysis No. 264.

Professor Klein analysed them and found that the bodies of the cockles had comparatively few microbes, but amongst these there were a good many b. coli and numerous streptococci, which showed that the cockles could not have been sufficiently heated, since b. coli and streptococci are killed by exposure to 70° C. (158° F.), that is 30° C. (or 54° F.) below boiling point of water, and he therefore considered these cockles were unsafe.

The Maplins were visited on the 3rd July, 1906, and some cockles gathered off the Sands, which, with a sample of water and mud from just a little beyond the Mouse Lightship, where several of the fishermen were gathering cockles, were submitted to Professor Klein for analysis, who found that only one cockle contained some coli-like microbes not b. coli communis, no streptococci, and no spores of b. enteritidis sporogenes.

See analyses Nos. 265, 266 and 267.

The water contained about 4,800 general microbes per 1 c.c.; it contained no b. coli in 1 c.c.; it contained no spores of enteritidis in 10 c.c.; it contained no streptococci in 1 c.c.

The mud contained about 28,000 general microbes per 1 c.c.; it contained no b. coli communis in 1 c.c.; it contained no streptococci in 1 c.c.; and it contained no spores of enteritidis in 10 c.c.

The result of the analysis showed that the cockles were exceptionally clean, that the water as water from near the shore was of a relatively clean character, containing no evidence of sewage or other filth pollution, and that the mud as mud from near the shore was of a like satisfactory character.

Two samples of cooked cockles were submitted to Professor Klein on the 6th July, 1906, for analysis, with a view to ascertaining whether the cockles contained b. coli and cocci and streptococci, to indicate whether or not the cockles had been sufficiently heated. Sample No. 268 was stated to be gathered from the Maplins, close to the Mouse Lightship, thence taken to Leigh, where they were cooked by steam pressure from 20 to 30 lb. for five minutes. Sample No. 269 was stated to be gathered from Leigh Creek, where they had been relaid for two days, and cooked in a similar manner. See analyses Nos. 268 and 269.

Sample No. 268 contained no b. coli, but three out of ten contained streptococci and two contained cocci (staphylococci). This sample had not therefore been sufficiently heated.

Sample No. 269 contained no b. coli, cocci, or streptococci. Three contained sporing bacillus subtilis, which is a harmless sporing microbe, the spores of which would not be destroyed even by boiling point of water in five minutes.

Having ascertained what could be done by efficient steaming, the Company wired the Rev. Stuart King prohibiting the sale of cooked cockles at Billingsgate Market from Leigh.

On 21st July, 1906, a sample of cooked cockles was made up of cockles taken out of two pads at Billingsgate Market, marked "R. H." and "W. O."; and also a second sample made up of cockles taken out of two other pads marked "W. M." and "A. N." respectively, the cocklers stating that the cockles had been taken from a point on the Maplins not far from the Mouse Lightship, and that some had been taken direct from the boats to the sheds, where they were cooked by steam for five minutes. See analyses Nos. 270 and 271.

The two samples were submitted to Professor Klein for analysis, who found both insufficiently cooked to destroy the sewage bacilli.

See analyses Nos. 272 to 279.

On 28th July, 1906, samples of mud, water, and cockles were taken from the Maplins and Leigh-on-Sea, as under:—

No. 272. Mud taken from the Maplins at a point off Black Tail Spit, immediately below the surface where the cockles are embedded.

No. 273. Mud taken within the same area as previous sample, but at a depth of about a foot.

No. 274. Water taken at a distance of about 100 yards whence the mud was taken, and from near the surface. The tide had been flowing for about an hour.

No. 275. Leigh drinking water taken from a barrel in Meddle's hut at Leigh. This water was put in the barrel for the purpose of washing cockles after they had been cooked.

No. 276. Cockles taken from the Maplins at a distance of about 300 yards from where mud (No. 273) and water (No. 274) were obtained, thence taken to Leigh, where they were cooked by steam in an oven for five minutes at a pressure of about 25 lb.

No. 277. Cockles taken from near the bed of Leigh Creek and within 200 yards of Leigh Sewage Works outfall. The cockles had been relaid in the Creek for about ten days. The cockles were steamed in an oven for five minutes at a pressure of about 25 lb.

No. 278. Cockles taken from the same parcel as those constituting sample No. 276, but were subjected to five and a half minutes' steaming at a pressure of about 25 lb.

No. 279. Cockles taken from the same parcel as those constituting sample No. 277, and were steamed for six minutes in an oven at a pressure of about 25 lb.

The whole of the above samples were submitted to Professor Klein for analysis, who found that the water, No. 274, was very good, and that the water, No. 275, was not good. With reference to the mud, No. 272, he found that it had spirilla (sewage ?) per c.c., and that the mud, No. 273, contained no spirilla. On the whole neither sample of mud was bad, although sample No. 272 might, on account of the spirilla

(supposing these are derived from sewage), be considered not so good as sample No. 273.

With regard to the samples of cockles, Professor Klein found sample No. 276 was clean and sufficiently heated; No. 277 he found two of eight had b. coli, a third had coli-like microbes, no streptococci; No. 278 one of eight had b. coli, no streptos; No. 279 one of eight had b. coli, no streptos.

On the 31st July, 1906, the Company sent the Rev. Stuart King the above particulars and full information, and asked him to warn the men on no account to place the cockles in polluted water, and to secure their effectual cooking.

On 7th August, 1906, four samples of cockles were taken direct from the Maplins, not relaid, and cooked as follows: Sample No. 283, steamed for one minute, steam then turned off and allowed one minute to cool, steam then turned on again and cooked five minutes. No. 284, steamed for one minute, cooled one minute, and cooked five and a half minutes. No. 285, steamed one minute, cooled one minute, cooked four and a half minutes. No. 286, steamed one minute, cooled one minute, and cooked four minutes.

See analyses Nos. 283, 284, 285 and 286.

These were submitted to Professor Klein, who found as follows: No. 283, of eight cockles none had b. coli communis, of four specially examined all had streptococci; No. 284, of eight cockles none had b. coli communis, of four specially examined none had streptococci; No. 285, of eight cockles, one had b. coli (communis ?), of four specially examined two had streptococci; No. 286, of eight cockles none had b. coli communis; of four specially examined none had streptococci. In the result, judging by the above experiments, samples 284 and 286 had been sufficiently heated, Nos. 283 and 285 had not.

Four samples of cooked cockles were handed to Professor Klein on 31st August, 1906, for analysis, which had been steamed at the sheds at Leigh, viz., No. 293, steamed two minutes, steam shut off one minute, and then steamed again for four minutes; No. 294, cockles laid two deep on tray and steamed five minutes; No. 295, steamed two minutes, shaken out of shells, and steamed four minutes; No. 296, steamed four minutes.

See analyses Nos. 293, 294, 295 and 296.

Professor Klein reported that of each sample eight cockles were examined, with the result that in none were either b. coli or streptococci discovered, and therefore it appeared that these cockles had been sufficiently heated.

The cocklers have agreed to report to the Company the grounds whence each week's supply is fished, and each basket of cockles to the London market is accompanied by a certificate as follows, viz. :—

COCKLES FROM LEIGH.

*I hereby declare that the cockles contained in the*_____ *hampers *sent (or brought) by me to Billingsgate Market this day, the*_____ *were taken from the*_____ *Sands, at a point known as the*_____*; thence taken direct to my shed, where they were thoroughly cooked by steam.*

* Strike out word not required.

*Address*_____

*Signed*_____

Surprise visits are paid by the Company's officers to see that the conditions laid down are strictly observed, and it is gratifying to know that the men are carefully carrying them out.

It is also being found that the expense incurred in installing apparatus for cooking by steam will, in a comparatively brief period, be defrayed by the economy experienced by the men in the consumption of fuel.

HADLEIGH RAY, near LEIGH.

The layings are situated near Leigh, and lie to the westward of Southend.

On the 28th January, 1903, samples of oysters and mussels were dredged from the layings of Mr. G. H. Hammond, Mr. T. M. Wright and Messrs. Baxter & Son, viz., mussels from Messrs. Baxter & Son, relaid Spanish oysters from Mr. Hammond, and American oysters (East Rivers) from Mr. Wright. See analyses Nos. 36, 37 and 38.

The analyses of the samples of mussels showed they were polluted to the extent of 50 per cent.; and the Spanish oysters 1 in 10 polluted. The American oysters were not polluted.

The pollution of these layings can only arise from the crude sewage of Southend, which is discharged into the Thames, or the effluent from the Leigh Sewage Works. The normal population of Southend is 30,000, which rises during the holiday season to, approximately, 80,000.

Further samples were taken and analysed in the month of February, 1903, from Mr. Hammond's layings, consisting of Portuguese, American and Native oysters, with the result that the Americans and Natives showed no pollution, the Portuguese were slightly, and the mussels badly, polluted. See analyses Nos. 58 and 59.

Two further samples of mussels were taken on 14th October, 1903, from the layings of Mr. Hammond and Mr. Wright respectively, and on analysis were found to be polluted; which was also confirmed by two other bacteriologists, Dr. C. Powell White of St. Thomas's Hospital, and Professor Boyce of Liverpool. See analyses Nos. 155 and 156.

On the same date a sample of American oysters (relaid in May, 1903) was taken from Mr. T. M. Wright's layings, also a sample of Portuguese (relaid in April, 1903), together with a sample of French (relaid in May, 1903), from Mr. G. H. Hammond's layings. On analysis all three of the above samples were found to be polluted, and their sale in the London markets was prohibited. See analyses Nos. 157, 158 and 159.

On 10th October, 1903, the Medical Officer of Health for the City of London obtained a sample of mussels from the shop of Mr. Hammond, 29, Monument Street, E.C., and submitted the

same to Professor Klein for analysis, who found they were polluted.

See analysis No. 185.

On the 11th December, 1903, Mr. G. H. Hammond forwarded a sample of Portuguese oysters which had been taken from his layings on the previous day. This sample was found on analysis to be polluted.

See analysis No. 193.

On the 30th December, 1903, Mr. T. M. Wright handed to the Company's Inspector a sample of Portuguese oysters which had been taken from his Hadleigh Ray layings on the 16th November, 1903, relaid at Brightlingsea on the following day, and taken up on 29th December, 1903. This sample was submitted to Professor Klein, and found on analysis to be polluted.

See analysis No. 194.

On the 31st December, 1903, Mr. Tabor forwarded a sample of Portuguese oysters which had been taken from Mr. Hammond's layings at Hadleigh Ray on the 11th December, 1903, and relaid at Brightlingsea on the 12th December, 1903, for 18 days. This sample was submitted to Professor Klein for analysis, and found to be polluted.

See analyses Nos. 204 and 205.

On the 19th January, 1904, a sample of Portuguese oysters taken from Mr. Tabor's layings at Brightlingsea, which were sent from Mr. Hammond's layings at Hadleigh Ray about the middle of December, 1903, and also a sample of American oysters taken from the same layings as above, which had been relaid at Brightlingsea in April, 1903, were submitted to Professor Klein for analysis, who found that the Portuguese oysters were polluted, and the Americans were clean.

See analysis No. 206.

On the 28th January, 1904, a sample of American oysters, dredged at low water from Mr. Wright's layings at Hadleigh Ray, relaid in April, 1903, was submitted to Professor Klein for analysis, who found they were not polluted.

See analyses Nos. 217, 218, 219 and 220.

On the 23rd August, 1904, a sample of Portuguese oysters and a sample of mussels were taken from Mr. Wright's layings at Hadleigh Ray at low water, also a sample of mussels from Mr. Hammond's layings (relaid April, 1904), and a sample

of mussels from Messrs Baxter & Son's layings at Hadleigh Ray, which had been relaid for some months. These samples were submitted to Professor Klein for analysis, who found that the oysters and mussels were polluted.

On the 21st, 22nd, 29th and 30th August, 1904, the Company's Inspector was at Southend, and watched the main sewer outfall, which is situate about 500 yards to the east of the end of the old pier, and made various tidal experiments with a view to tracing the course of the sewage when discharged, with the result that the officer was satisfied that Hadleigh Ray was polluted by sewage from Southend.

A further visit was made on the 11th October, 1904, and a sample of the water was taken at 9.5 a.m. from the surface of the water at the west side of Southend Pier, and at about 20 yards from the end of the old pier in a south-westerly direction, which was submitted to Professor Klein for analysis, who found that the water was strongly polluted with sewage. See analysis No. 223.

Another sample of water was also taken by the Company's Inspector on the 12th October, 1904, at 7.35 a.m. from near the surface of the water in the Swatch, and at a distance of about 30 yards to the west of the western outfall of Southend-on-Sea. The sample was submitted to Professor Klein, who found that the water as sea water taken from near the shore was quite passable, and could not be considered to be polluted. See analysis No. 225.

On 5th November, 1905, the Company's Inspector again visited the main sewer outfall at Southend at about 11.15 a.m., when he found liquid sewage discharging freely, discolouring the water to a width of about 30 feet immediately upon leaving the outfall, and taking a south-westerly course; and this was again noticed to be the case at 11.35 a.m. At noon the discharge had considerably slackened.

On Monday, 6th November, 1905, the Company's Inspector again visited the layings of Mr. T. M. Wright at Hadleigh Ray, and took at low water (the bed being dry) a sample of Portuguese oysters which had been relaid there for about seven months. This sample was submitted to Professor Klein, See analysis No. 243.

who found upon analysis that they were not passable, since 50 per cent. had been exposed to recent pollution.

The result of this analysis was forwarded to Mr. T. M. Wright, and notice was given that the sale of these oysters could not be allowed in the London markets.

See analysis No. 245.

On 15th November, 1905, a sample of American oysters was received from Mr. Wright, stated by him to have been relaid in his layings at Hadleigh Ray in April, 1905, and handed to Professor Klein for analysis, who reported the oysters were not polluted.

See analysis No. 249.

On the 15th December, 1905, the Company's Inspector received from Mr. Wright's foreman a sample of Portuguese oysters (100) which he stated he had taken from the Hadleigh Ray layings, and were similar oysters from the same place as sample No. 243. This sample was forwarded to Mr. W. J. Bean by the Inspector, with whom arrangements had been made to relay them in his West Mersea layings, which was accordingly done, and on the morning of Thursday, 28th December, 1905, a portion of the 100 oysters was taken up, after having been on the beds 11 days, and submitted to Professor Klein for analysis, who examined eight of the oysters and found they were quite clean.

See analysis No. 251.

On the 5th January, 1906, the Company's Inspector took a sample of Portuguese oysters from Mr. Wright's layings at Hadleigh Ray, at low water, from the same beds as those of sample No. 243, which on analysis was found to be polluted.

See analysis No. 260.

On the 9th May, 1906, the Company had a sample of Portuguese oysters taken out of two bags of oysters (part of a consignment of four bags) which had arrived that morning at the shop of Mr. T. M. Wright, at Billingsgate Market, from his layings at Hadleigh Ray, which on analysis was found to be unclean.

See analysis No. 310.

A sample of live winkles was taken, on 27th October, 1906, out of a bag before delivery to Mr. Wright at Billingsgate Market, which it was stated had been gathered from his grounds in Hadleigh Ray, and on analysis was found to be clean.

The Company having received information that Mr. T. M. Wright, Billingsgate Market, was selling North Dutch oysters which had been relaid in his layings at Hadleigh Ray, the Company's Inspector on the 12th November, 1908, took from Mr. Wright's shop in the market two samples of these oysters, it being admitted at the time that the oysters had been relaid in Hadleigh Ray since the previous Saturday (7th November). These samples were submitted to Professor Klein, who found them polluted and potentially dangerous. A seizure of one barrel and one part barrel of North Dutch oysters which were exposed for sale was made.

See analyses Nos. 383, 384.

On 14th November, 1908, another sample was taken from the same consignment as above, in conjunction with Mr. T. M. Wright, who took a sample himself. The further sample was submitted to Professor Klein, who found that the oysters were distinctly polluted.

See analysis No. 385.

Proceedings were instituted by the Company against Mr. T. M. Wright, for having in his possession for sale on the 12th November, 1908, 600 oysters which were unwholesome and unfit for food. The summons was heard at the Mansion House Justice Room, on the 30th November, 1908, when Mr. Wright, having pleaded guilty, was convicted by the Lord Mayor, and ordered to pay a penalty of £15 15s. and £10 10s. costs, or in default one month's imprisonment. The amount of the penalty and costs was paid into Court.

RIVER MEDWAY.

There are various oyster layings in this river, situate in creeks on either side of the estuary.

Inspections have been made of the layings, and samples of oysters taken for analysis, as hereinafter mentioned.

The discharge of sewage direct into the River Medway from Chatham, Rochester, Frindsbury and other places, including several of the Government establishments at Rochester, is,

to some extent, found to be a source of potential danger to the fisheries.

CAPTAIN'S CREEK AND MEDWAY SALTINGS.

These layings, in the occupation of Mr. G. Fieldgate, were also inspected on the 4th February, 1903, and samples of Natives and Portuguese oysters taken. The Portuguese oysters were originally from Archachon, and relaid about 20th March, 1902.

See analyses Nos. 47 and 48.

The Natives on analysis were found not to be polluted, but the Portuguese were polluted to the extent of 25 per cent.

These layings cover an area of 40 acres; there is no sewage outfall within a distance of five miles.

Mr. Fieldgate forwarded on the 16th February, 1903, a sample of Portuguese oysters for analysis, which he stated had been taken from Hamoose bed on the morning of the 15th February, adjoining Captain's Creek, which were grown from the spat of 1901, and were practically British born. Professor Klein reported that on analysis the oysters showed no pollution.

See analysis No. 64.

COALMOUTH CREEK.

These layings, which are in the occupation of Messrs. Baxter & Son, were visited on the 4th February, 1903. Samples of Natives were taken from a tank at the side of the creek and from a pit. Samples of Portuguese and American oysters were also taken from the layings.

See analyses Nos. 52, 53, 54 and 55.

The analyses showed the Natives and Americans were not polluted, and the Portuguese polluted to the extent of about 30 per cent.

There are apparently no sewage outfalls near the layings.

LONG REACH, near QUEENBORO'.

Long Reach is situate about two and a half miles from Queenboro' and six miles from Sheerness. The layings were in the occupation of Mr. Saunion. They were inspected on 6th

February, 1903. It was ascertained that the pits at these layings had not been used for the storage of oysters for some years, and that there was no sewage of any kind near the layings, the nearest sewage outfall being at Queenboro', but a foul slop drain was discharged to the rear of some disused oyster ponds. A sample of Natives was taken at low water (12 feet deep) and submitted for analysis, and found to be only slightly polluted. See analysis No. 60.

On the 17th February, 1903, a sample of Portuguese oysters, stated to have been taken from these layings, was received from Mr. Saunion's shop in Lower Thames Street for analysis. This sample was accordingly submitted to Professor Klein, who found that "one of ten oysters contained b. coli communis and b. enteritidis sporogenes." See analysis No. 69.

These layings were again inspected on the 2nd February, 1904.

Two samples of Natives were taken just after high water, and one sample was submitted to Professor Klein for analysis, who reported that only one out of nine oysters contained b. coli in small numbers, the rest were clean. The second sample was retained by Mr. Saunion for analysis, on his behalf by Dr. Eyre, who pronounced the oysters to be clean. See analysis No. 208.

PINUP REACH.

These layings, which were in the occupation of Mr. J. M. Tabor, were also inspected on the 4th February, 1903, and samples of French and Natives taken. These samples were taken at low water, and, so far as could be ascertained, there was no sewage outfall in the vicinity of the layings. On analysis of the oysters no pollution could be detected. See analyses Nos. 56 and 57.

On 2nd June, 1909, the Company's Inspector visited, by request of Mr. J. Pullen, Oyster Merchant, Hoo, his layings at West Hoo Creek, which were in 1903 in the occupation of Mr. J. M. Tabor. Mr. Pullen stated that recently large quantities of mud had been brought in barges from Rochester and dumped down in close proximity to his oyster layings, and

that he had since remonstrated with the Rochester Authority, who had desisted discharging any further quantities for three weeks, but he feared that his fishery had been polluted, and he had taken steps to remove all his oysters to another laying, and in fact had refused to execute any orders until he was satisfied the oysters were free from pollution, for which purpose a sample of native oysters was taken from the Creek, and afterwards submitted to Professor Klein for analysis, who found the oysters were passably clean.

See analysis No. 418.

See analysis No. 420.

On 15th June, 1909, Mr. Pullen forwarded a sample of Portuguese oysters, taken from his layings in the Creek on the previous day, to the Company, who submitted them to Professor Klein, who found upon analysis that the oysters were not clean.

See analysis No. 426.

At the Company's request Mr. Pullen forwarded on 29th June, 1909, a further sample of Portuguese oysters taken from his layings the previous day in Top Reach, just below Middle Creek, from clean stony ground, having been placed in bags for upwards of 21 days. This sample was submitted to Professor Klein, who found that the oysters were unclean.

RAINHAM GROUNDS.—BARTLETT CREEK AND OTTERHAM CREEK.

Mr. Bean and Mr. Knowles have layings here, and they were inspected on the 4th February, 1903. Samples of Natives and Portuguese oysters were taken and analysed. The Natives were free from pollution, but the Portuguese were found to be contaminated to the extent of 30 per cent.

See analyses Nos. 45 and 46.

A sample of Portuguese oysters was taken on 23rd October, 1903, from the shop of Messrs. Sydney Barber, in Lower Thames Street, E.C., from a consignment made to that firm by Messrs. Knowles & Co., from the above layings, and upon analysis the oysters were found to be polluted. Consequently their sale in the London market was prohibited.

See analysis No. 162.

On 29th October, 1903, these layings were again visited, Mr. Knowles being present, when further samples of oysters were taken, in duplicate, viz., Portuguese from the middle and

east end of the layings, and Natives born and bred in the layings. Mr. Knowles took possession of two samples, and the Company's Inspector the other two. The latter two samples were submitted to Professor Klein for analysis, and were both found to be polluted.

See analyses Nos. 168 and 169.

Bartlett and Otterham Creeks are in close proximity to each other. In Otterham Creek a large quantity of London refuse and manure was found discharged from barges on the banks of the creek, and after heavy rains filthy liquor flowed freely into the creek therefrom. Along the eastern side of this creek the contents of several closets passed into it, in addition to the discharge from the outfall of Rainham. It is probable, therefore, the pollution found in the oysters emanated from these sources.

On the 26th May, 1904, a sample of Portuguese oysters was taken from a shop in Lower Thames Street, believed to have come from Mr. Knowles' layings in Bartlett Creek. This was submitted to Professor Klein, who reported that he did not consider the oysters were objectionable from a bacterial standpoint.

See analysis No. 213.

On 23rd June, 1904, the Company's Inspector (in company with Mr. Knowles) again visited Rainham, and made a series of tests for the purpose of ascertaining the set of the tide in the vicinity of Bartlett and Otterham Creeks, and the conclusion arrived at was that the first flow of the tide entered Yantlett Creek and Bartlett Creek, and that a considerable time elapsed after the commencement of the flow before any water entered Otterham Creek.

A sample of water was taken off the surface in a sterilised bottle close to and eastward of Wallop Stone, situate at the mouth of Bartlett Creek, and submitted to Professor Klein on 27th June, 1904, who reported that, as surface water, it was bacterially quite satisfactory.

See analysis No. 216.

Since the inspection above referred to was made Mr. Knowles has most successfully exerted himself with the different authorities with a view of getting the nuisance in Otterham Creek abated.

SHARFLEET CREEK.

Mr. W. H. Williamson's layings are situate in this creek, and were inspected on the 4th February, 1903.

He has constructed a large reservoir for the storage of oysters, over which a large quantity of sea-water passes every 12 hours.

See analyses Nos. 49, 50 and 51.

There were submitted for bacteriological examination samples of Natives, one from the layings and one from the reservoir, and also a sample of the water from the reservoir. The water was found to be polluted and the oysters slightly polluted.

See analysis No. 67.

Professor Klein had submitted to him on the 17th February, 1903, a sample of Portuguese oysters from Mr. Williamson's shop in Upper Thames Street, stated to have been taken from these layings. He reported that they were slightly affected by sewage.

STANGATE CREEK.

On the 9th February, 1903, Messrs. Hole & Dodd's layings were visited. They relaid Natives, French, Americans and Portuguese. No pits were used for storage purposes, and, so far as it could be ascertained, no sewage whatever passed over these layings.

See analysis No. 62.

A sample of Natives was taken from these layings at low water, and, on analysis, was found not polluted.

See analysis No. 68.

On the 17th February, 1903, a sample of Portuguese oysters, stated to have been taken from these layings, was received from Messrs. Hole & Dodd's shop in Upper Thames Street, and submitted to Professor Klein, who found that "one out of ten oysters contained b. coli communis and b. enteritidis sporogenes."

On 23rd January, 1909, a sample of Portuguese oysters was taken out of an unopened sack in the shop of Messrs. Hole & Dodd, in Monument Street, E.C., stated to have been received from the firm's layings known as Stangate Creek. On analysis they were found by Professor Klein "not clean." See analysis No. 398.

PORTUGUESE OYSTERS.

In the several samples submitted to Dr. Klein for analysis, it appears that the Portuguese oysters give less favourable results than any of the other descriptions. Whether it is from the nature of the shell, which is more concave than any of the other species of oysters, and therefore may have greater difficulty in freeing itself from deleterious matter, or from its original grossly polluted source, it is at present difficult to explain. But, without doubt, it has been shown in the course of the several experiments which have been made, that the British-born Portuguese oyster, which in all respects as to shell and its construction is like its relative, is purer, and, if the conditions are good, quite equal as an article of food to French and American relaid oysters.

THE SWALE.

The oyster layings belonging to Mr. Max Ullmann extend from South Deep to Elmley Ferry.

The Company's Inspector visited these layings on 20th March, 1903, and inspected a large number of pits which are situate on Fowley Island, and used for storage purposes.

So far as could be seen there did not appear to be any sewage outfalls near these layings, the nearest point being Milton Creek, where the sewage is treated, and the effluent discharged into the River Swale.

Three samples of oysters were taken at half-flood at different parts of the layings between Windmill Creek and South Deep, viz., Natives, French and Portuguese, which were See analyses Nos. 96 and 97.

submitted to Professor Klein for analysis, with the result that the French were found to be markedly polluted, the Natives slightly, and the Portuguese polluted to the extent of 30 per cent.

On the 6th April, 1903, Mr. Max Ullmann was informed by letter that the Company could not permit the sale of the French and Portuguese oysters in London.

See analyses Nos. 129 and 130.

On the 22nd June, 1903, a Sanitary Inspector in the service of the Corporation of the City of London seized two bags of oysters from the shop of Mr. Max Ullmann, which had arrived by rail, and were stated to have been taken from the South Deep Channel layings in the River Swale. Samples of oysters taken from each of the two bags were submitted by Dr. Collingridge to Professor Klein for analysis, who found that both samples were distinctly sewage-polluted, and a Magistrate's Order was obtained by Dr. Collingridge for the destruction of the two bags of oysters.

On the 15th August, 1903, the Company's Inspector again visited Mr. Ullmann's layings, and received from Mr. Ullmann

See analyses Nos. 129a, 130b and 131.

three samples of oysters and two of mud. The three samples of oysters were described as "Oysters No. 1," "Oysters No. 2" and "Natives, Main Channel No. 3," and the two samples of mud as "South Deep Mud No. 1" and "Peg Fleet Mud No. 2."

The whole of these samples were submitted to Professor Klein, and upon analysis Oysters No. 1 were found *not* to be polluted, Oysters No. 2 were grossly polluted, and Oysters No. 3 were polluted to the extent of about 30 to 35 per cent.

The mud from "South Deep" was not at all bad, but the mud from "Peg Fleet" was almost equal to sewage, or manure slightly diluted.

See analysis No. 314.

A sample of oysters was taken on the 28th November, 1906, from a box at Mr. Ullmann's shop in Lower Thames Street, stated to have been "purchased from Messrs. Hole & Dodd," but believed to have been taken from Windmill Creek, River

Swale, which Mr. Ullmann afterwards admitted was the fact. On analysis they were found not to be clean.

On 14th January, 1907, a sample of mussels was taken from Hammond's shop, Pudding Lane, which had been sent from Leigh-on-Sea, but the Company's Inspector found that they had been taken out of the River Swale at a point situate between Faversham Creek and Milton Creek. It was found on analysis the mussels were decidedly unclean. See analysis No. 321.

A sample of oysters was taken on the 1st January, 1909, from a bag of oysters in Mr. Max Ullmann's shop in New Broad Street, which the Company's Inspector was informed had arrived at the shop that morning, and stated by Mr. Ullmann to have come from the Elmley Ferry layings. A further sample of oysters was also taken out of the window of the shop, stated to have been received the previous day also from the Elmley Ferry layings. Both samples were submitted to Professor Klein, who found No. 394 slightly polluted and No. 395 "decidedly polluted." See analyses Nos. 394, 395.

On 20th January, 1909, a sample of oysters was taken from Mr. Ullmann's layings in the River Swale, known as "Elmley layings," and submitted to Professor Klein, who found upon analysis "oysters passable." See analysis No. 397.

On 1st April, 1909, some oysters, stated to have been taken from the mouth of Milton Creek, were purchased at a shop in Milton Road, Sittingbourne, and forwarded by the Medical Officer of Health, Dr. Heggs, for analysis. Professor Klein found in the result, "oysters passable." Upon enquiry it could not be definitely ascertained whether the oysters had been taken from Milton Creek, as alleged, or not. See analysis No. 413.

On the 7th May, 1909, an inspection of the Swale was made for the purpose of testing the tidal currents, from the mouth of Milton Creek down through the main channel to the mouth of Faversham Creek, and from thence to Ham Gat Buoy, with the result that it was apparent, both on the ebb and flow, that sewage from Milton Creek and Faversham could pass over Elmley Ferry, and if the sewage from these places were not

treated, it would undoubtedly affect the oyster layings in the Swale.

See analysis No. 414.

A sample of water was taken about 100 feet S.S.W. of Ham Gat Buoy and submitted to Professor Klein, who found that the water was satisfactory for surface water.

See analyses Nos. 415, 416.

On 12th May, 1909, two samples of oysters were dredged, in the presence of Mr. Max Ullmann, from the Elmley layings in the Swale. The laying extends, roughly, about one and a half miles east of Elmley Ferry. Sample 415 was dredged at the eastern extremity of the laying, situate about a quarter of a mile from the Ferry. Sample 416 was dredged from the eastern extremity of the laying. The oysters had been relaid from a fortnight to a month. Dr. Klein reported upon analysis Sample No. 415, "oysters not clean"; No. 416, "oysters not clean, but better than No. 415."

See analysis No. 419.

At the request of the Trustees of the Queenborough Fishing Trust, the Company's Inspector, on the 3rd June, 1909, inspected their oyster grounds, which are situated in the West Swale, and are over two miles in extent, viz., from near Ladies Hole Point to King's Ferry, the part of the grounds utilized for preparing oysters for market being in the vicinity of Codd's Creek, Long Reach. A sample of natives was dredged close to Codd's Creek, and submitted for analysis to Professor Klein, who found that the oysters were not clean.

The nearest possible sources of pollution to these oyster beds were Sheerness and Queenborough, the latter town with some 380 inhabited houses and a population of from 1,500 to 2,000, whose crude sewage drains into Queenborough Creek, and its main outfall, which is in the vicinity of the chemical works abutting on the Creek, passes into the Swale. Mr. Small, the Harbour Master, states, however, that during normal weather, when the tide is on the flow, the sewage is stored in a culvert constructed for the purpose, and released only on the ebb, when, it is believed, it passes to the sea. The sewage of Sheerness is discharged on the ebb between the town and the steamboat pier. The other sources of pollution are in Milton Creek, viz., the outfalls of Murston, Sittingbourne and Milton

respectively. In all three towns the sewage is stated to be treated, and only the clarified effluent is discharged into Milton Creek. In estimating the suitability of Long Reach as a place for preparing oysters for market, it is necessary to bear in mind the great depth of water from Queenborough to the furthermost extremity of Long Reach. In places this is as much as 34 feet, and nowhere less than 10 feet at low water, and it was therefore thought desirable that another sample of oysters should be taken, which was accordingly dredged at low water from close to Codd's Creek on the 28th June, 1909, and submitted to Professor Klein for analysis. He reported that the oysters were questionably clean. The result of these two analyses was forwarded to Mr. C. B. Harris, Solicitor to the Trustees.

See analysis No. 427.

FAVERSHAM.

The layings of the Faversham Oyster Company extend eastward of South Deep, in the River Swale, part of the layings westward of Harty Ferry being, at the time of the inspection of the layings by the Company's Officer on the 24th January, 1903, in the occupation of the East Kent Oyster Company. These layings have since reverted to the Faversham Oyster Company.

The Manager, Mr. W. P. Coleman, stated that the oysters were brought from Whitstable and relaid on the Harty shore till required for market.

A sample of oysters was taken from the layings at a quarter ebb, and afterwards submitted to Professor Klein for analysis, who reported that one out of ten oysters contained a coli-like microbe, but no b. coli communis.

See analysis No. 35.

On the 13th November, 1903, two samples of Native oysters were taken: (*a*) from the Beacon grounds of the Faversham Oyster Company, about half a mile east of Harty Ferry; (*b*) from the same grounds, about half a mile west of Harty Ferry, called Harty Shore, both samples being dredged at half ebb. These were submitted to Professor Klein on the

See analyses Nos. 173 and 174.

14th November, who found on analysis that both were sewage-polluted to about the same degree.

These layings are exposed to serious pollution in the following manner. They are situate at a point not far removed from the entrance to Faversham Creek. The crude sewage of Faversham, which has a population of about 12,000, is discharged into Faversham Creek, and a quantity of London refuse is also dumped in the neighbourhood of the sewer outfall, the droppings from which add to the pollution of the creek. There is also Oare Creek, which branches from Faversham Creek, and the upper banks of this creek are also used for the deposit of London filth. In addition, there is a sewer which discharges into the creek, as well as a latrine used by the navvies employed there.

Dr. Evers, the Medical Officer of Health for Faversham, stated there was room for improvement with reference to the drainage of the town, and hoped that the authorities would move in the matter.

Faversham was again visited on the 17th July, 1906, and a careful examination made of the Back Water at the end of the creek, also the main sewer outfalls close to Ash Dock from which crude sewage was being discharged freely. The water emerging from a bank almost opposite the mouth of the creek was distinctly discernible for some distance into the River Swale. When the tide was out of the creek the bank was examined for some 2½ miles in length, and it appeared nothing more or less than an open sewer, which confirmed the opinion formed on a previous inspection.

See analysis No. 300.

A third inspection was made on October 20th, 1907, when at about 5.15 p.m. it was observed that the waters issuing out of the creek were being diverted to the middle of the River Swale, the result being that the incoming tide would carry such waters over the oyster grounds in the Swale to the west of the creek. In the vicinity of Oare Creek the rush of water was very strong owing to the Back Water having been liberated. A sample of water was taken just above the entrance to Oare Creek, from just below the surface. Professor Klein reported, on analysis, that the water was strongly polluted.

Proceedings were instituted in the Court of Chancery by the Faversham Oyster Company against the Corporation of Faversham for pollution of the Company's oyster beds, which was tried before Mr. Justice Eve in June, 1908. The Clerk of the Fishmongers' Company, together with two of their Inspectors, gave evidence, and the trial was concluded and judgment given on the 22nd June for the Faversham Oyster Company, with damages to be assessed by the Official Referee, and an injunction granted to restrain the Faversham Corporation from further polluting the oyster fishery, which was stayed for six months to enable the Corporation to make other arrangements. Notice of Appeal was given by the Corporation, which was heard on the 23rd of November, 1908, before the Master of the Rolls, and Lords Justices Fletcher Moulton and Farwell, who, without calling upon Counsel for the Respondents, dismissed the Appeal with costs, a month being allowed to lodge an Appeal to the House of Lords, in which case the Injunction would be suspended for another five months from January, 1909. The Appeal was lodged, but the Action has since been settled upon the following terms, viz. :—

1. The Appeal to the House of Lords withdrawn ;
2. The Injunction and declaration as to title to stand ;
3. The Injunction to be suspended until the 31st December, 1910, with liberty to apply to the Court if the drainage scheme is not properly proceeded with ;
4. The sum of £4,250 to be paid in settlement of the costs and damages. No further sum to be paid for damages until after 31st December, 1910.

WHITSTABLE.

At Whitstable the oyster layings are owned by the Whitstable Oyster Company and the Seasalter & Hain Oyster Fishery Company.

An inspection was made on 9th and 10th January, 1903. It was found that the sewage from the Whitstable Main Sewer

flowed into the Harbour, and at the mouth of the outfall a flap was attached, which was closed by the pressure of the incoming tide, and consequently the release of the sewage took place at about two to three hours before low water, a quantity of which finds its way into the inner Harbour.

The Urban District Council of Whitstable only became responsible for the sewage of the town on the 1st January, 1903, but looking to the mode of the discharge of sewage, there can be no doubt that the oyster industry, as well as the health of the town, is endangered by the present system.

The layings of the Whitstable Oyster Company are situate from one and three-quarters to two miles from the beach, are two miles in length and three-quarters of a mile in width.

The Company have three pits, each constructed to contain an average depth of about five feet of water. The pits are built in cement, percolation is prevented and their complete emptying is ensured. Dr. Bulstrode's suggestion relative to the admission of water into the pits was adopted, with the result that water could not flow into them an hour and a half after high water, and not until the tide had been flowing about four hours. The oysters for market purposes were suspended in nets in the pits, and before despatch to market individually scrubbed.

The layings of the Seasalter & Ham Company are known as the "Ham" and "Pollard" grounds, the former approximately north-east, and the latter to the west of the layings of the Whitstable Company.

The Seasalter & Ham Company also used cemented pits, and, percolation being prevented, the emptying and filling of them, as well as the scrubbing of the oysters before despatch to market, also applied to this Company.

Samples were taken from the layings of the Whitstable Oyster Company, viz.: "Imperials," "Natives" and "Large Natives," and a sample of water was also taken from about the middle of the layings called the "slank," and also a sample from one of the pits.

Samples were also taken from the layings of the Seasalter & Ham Company, viz.: Whitstable Natives from the Ham layings and Whitstable Natives and "Princesses" from the Pollard layings.

Samples of water were also taken, one from the Ham layings and one from the Ham pit. On analysis the various samples were reported upon as follows, viz.:—

WHITSTABLE OYSTER COMPANY.

Royal Whitstable Natives	None polluted.	See analyses Nos. 10, 11, 12, 15, 16.
Natives	do.	
Imperials	do.	
Water from layings	Not polluted.	
Water from pit	Polluted.	

SEASALTER & HAM COMPANY.

Whitstable Natives (Ham layings)...	Not polluted.	See analyses Nos. 17, 18, 19, 20, 21.
Natives (Pollard layings)	do.	
Princesses do.	do.	
Water (Ham layings)	Polluted.	
Water (Ham pit)	do.	

On the 21st January, 1903, further samples of water and oysters were taken from one of the Whitstable Oyster Company's pits, and were reported upon as follows:—

Water from pit	Polluted.	See analyses Nos. 31 and 32.
Oysters from pit	One out of ten had coli-like bacilli but no b. coli communis.	

A further sample of water was also taken from the Seasalter & Ham Company's pit, together with another sample of oysters, "Princesses," from the "Pollard" layings, which were reported upon as follows:—

Water from pit	Polluted.	See analyses Nos. 33 and 34.
Oysters ("Princesses"), Pollard layings	One out of ten had b. coli communis and b. enteritidis sporogenes.	

From the above analyses, both the Whitstable Oyster Company and the Seasalter & Ham Company determined at once

to close their pits, and the latter Company also ceased to relay oysters on that part of the "Pollard" layings where the "Princesses" before referred to were taken.

SEASALTER & HAM LAYINGS.

On 9th December, 1903, the Company's Inspector made a purchase of one dozen Native oysters at the shop of Messrs. Pimm & Co., in the Poultry, E.C., which had been received by them on the 8th December from Messrs. Gann's layings at Whitstable, which sample was submitted to Professor Klein for analysis, who found that two out of eight oysters had b. coli communis in small numbers.

See analysis No. 183.

On the 21st December, 1903, the Company's Inspector visited these layings, and took a sample of Whitstable Natives from the "Pollard" layings, and also a sample of "Princesses" from the "Ham" layings, which were submitted to Professor Klein for analysis. The Natives were found not to be polluted but the "Princesses" were found to be a little doubtful. Consequently a second sample of these oysters was taken on the 24th December, 1903, by the Company's Inspector and submitted to Professor Klein for analysis, who reported that the Natives (taken from the southern extremity of the Pollard layings) were practically free from pollution, but the "Princesses" (taken from the upper part of the Pollard layings) showed that of eight oysters five contained b. coli communis in numbers.

See analyses Nos. 189 and 190.

See analyses Nos. 191 and 192.

On the 24th March, 1904, the Company's Inspector obtained a sample of oysters at the Holborn Restaurant, which had been received in a consignment from the Seasalter & Ham Oyster Fishery Company, Whitstable. This sample was submitted to Professor Klein for analysis, and found to be not polluted.

See analysis No. 212.

On the 19th September, 1904, the Company's Inspector took a sample of Whitstable Natives from the Pollard Native Grounds, which had been relaid on the grounds in the previous February, the oysters being dredged at high water—and also a sample of Whitstable Natives from the outer Native grounds, which had been relaid there in the previous March. It was

reported to the Inspector that no oysters had been relaid on the upper part of the Pollard layings.

Both the above samples were submitted to Professor Klein for analysis, who reported that the oysters from the Pollard Native grounds were polluted, but those from the outer Native grounds were not. See analyses Nos. 221 and 222.

In May, 1904, the Company's Inspector made tidal experiments at Whitstable, with a view of ascertaining the direction of the flow of the sewage from the outfalls of Whitstable and Tankerton. These experiments were conducted at neap and spring tides respectively, and it was ascertained that the path traversed on the neap and spring tides did not differ to any material extent, and the Company's Inspector satisfied himself that the layings of the Whitstable Company and the Seasalter & Ham Company were not exposed to pollution from the sewage of Whitstable and Tankerton.

The Whitstable Oyster Fishery Company's pits were inspected on the 7th December, 1906, as also the Seasalter and Ham Company's layings.

The Whitstable Company's pits were found to be all exposed, but the Foreman assured the Inspector that the pits were not being used for storage purposes; but on his attention being called to the second pit he admitted that they did use that pit for rinsing and cleaning the oysters prior to their being despatched to market. The Whitstable Company at the request of the Company have since closed the pits.

The Seasalter and Ham Company have boarded over all their pits with the exception of a small trapdoor, and have converted the place into a warehouse. An undertaking has been given that the pits will not be used for storage purposes.

In consequence of a reported case of typhoid a sample of oysters was taken on the 9th January, 1906, from the shop of Mr. Thos. Higgins, fishmonger, No. 65, Connaught Street, Hyde Park, which had been received by him from Messrs. Farran & Carter, fish merchants, 85, Lower Thames Street, E.C., and See analysis No. 252.

stated to have been consigned to them by the Seasalter and Ham Oyster Fishery Company, Limited, Whitstable, on the same date. The sample was submitted to Professor Klein for analysis, who found that the oysters were distinctly unclean.

See analysis No. 253.

A sample of oysters was taken out of a barrel of oysters in the shop of Messrs. Farran & Carter, 85, Lower Thames Street, on the 12th January, 1907. On the barrel was a label as follows: "Selected Natives from the Seasalter and Ham Fishery Company, Limited, Whitstable," addressed to Mr. F. Gann, 11, Lower Thames Street, E.C. The sample was submitted to Professor Klein for analysis, who found them fairly clean.

See analysis No. 315.

A sample of Native oysters was taken on the 7th December, 1906, on the Whitstable Oyster Company's premises, Fish Street Hill, made up out of four separate parcels which were stated to have come from their own grounds at Whitstable. Professor Klein found upon analysis that the "oysters were fairly clean."

See analysis No. 316.

A further sample of oysters, known as "Empress," was taken on 11th December, 1906, from the Company's premises, from a barrel of oysters received from Whitstable. Mr. Kemp also took a sample out of the same barrel for submission to his Company's bacteriologist, which was sealed by the Company's Inspector. The sample was submitted to Professor Klein for analysis, who found the oysters fairly clean.

See analysis No. 317.

On same date Pimm's establishment in the Poultry was visited, and a sample of oysters obtained which were stated by the manager to be "Gann's Whitstable Natives." This sample was submitted to Professor Klein, who found the oysters fairly clean.

See analysis No. 399.

On 27th February, 1909, a sample of oysters was taken from the "Trocadero," received by Messrs. J. Lyons & Co., Limited, stated to have been received by them from the Seasalter & Ham Oyster Fishery Company, Whitstable. The sample was submitted to Professor Klein, who found that the oysters were distinctly unclean.

The Company's Inspector on the 2nd March, 1909, took a sample of oysters from the shop of Mr. Gann, in Lower Thames Street, stated to have been received from the Ham grounds. This sample was submitted to Professor Klein, who found that the oysters were passably clean. See analysis No. 400.

On the same date the Company's Inspector visited the Seasalter & Ham grounds at Whitstable, and took, by way of a sample, six oysters from the "Outer-half Ware," and six oysters from the "Flat Native Grounds." Professor Klein found upon analysis that the oysters were not clean. See analysis No. 401.

On 9th March, 1909, the Company's Inspector visited the Seasalter & Ham grounds and took a sample of "Natives" from the "Pollard" layings, also a sample from the "Outer-half Ware" and "Flat Native Ground," also a sample of oysters from the Faversham Dredgermen's ground at Whitstable, together with a sample of water from the "Pollard" and "Outer-half Ware" grounds, all of which were submitted to Professor Klein, who found that oysters No. 402 were passable, and No. 403 were fairly clean, No. 404 were clean, and both samples of water—Nos. 405 and 406—clean. See analyses Nos. 402, 403, 404, 405, 406.

On 12th March, 1909, a sample of water taken from the rising main of Water Company's water at Whitstable, and used by the Whitstable Oyster Fishery Company for washing their oysters, was submitted to Professor Klein for analysis, who found the water quite clean. See analysis No. 407.

On Saturday, 19th June, 1909, Mr. J. Wrench Towse, the Clerk of the Company, accompanied by the Company's Inspector, visited Whitstable, and inspected the Whitstable sewer outfall, which is situated immediately outside the West entrance to the dock, and was under water at 4.30 a.m.

At 5.15 a.m. it was completely exposed, and a great rush of sewage was issuing; it was stated that it had been pent up during high water, and had only just been liberated. At 8 a.m., or half-an-hour after the commencement of the flow, there was in the neighbourhood of Grays End Bank a large stretch of water strongly charged with sewage, and with a view of ascer-

taining the direction taken by the sea in the neighbourhood of the harbour, while sewage was in full discharge, tests were made with four sets of bottles dropped at various times outside the entrance to the harbour—the bottles constituting each set being connected with string, a little over a yard separating each bottle.

The result of the experiments only confirmed those carried out by the Company's Inspector in 1904, and referred to on page 55.

From 4.30 a.m. to 11 a.m. there was a gentle south-westerly breeze; after 11 a.m. this breeze at times was strong.

Samples of water and oysters were taken as follows:—

(1) Water taken from Ham Fishery Market Grounds, and known as "Outer-half Ware," at 12.30 p.m. from the bottom, also sample of oysters dredged from same place.

See analyses Nos. 421, 422.

(2) Water taken from the Pollard, and from a part known as the "Pollard Native Ground" from the bottom, also sample of oysters dredged from the same place.

See analyses Nos. 423, 424.

(3) A sample of oysters dredged off the grounds by the Whitstable Oyster Company during the morning, and stated to have been taken from the Brittany grounds, which are situate at the south-east of the Market beds, and are nearest to the Whitstable drainage outfall.

See analysis No. 425.

The foregoing samples of water and oysters were submitted to Professor Klein for analyses, who found that with regard to samples 421 and 422 the water was quite satisfactory; the oysters "satisfactorily clean."

With regard to samples Nos. 423 and 424, the water was satisfactory as surface water, the oysters "clean"; and with regard to samples of oysters No. 425, the oysters were satisfactorily clean.

SOUTHWICK, SUSSEX.

At Southwick there are oyster layings in the South Channel and several pits on the foreshore, owned by Messrs. Brazier Bros.

An inspection was made on 9th January, 1903. It was found that the sewage from Southwick flowed out in close proximity to the pits, and would ultimately be diffused over the layings.

Samples were taken from the layings and pits at low tide, which were then covered with about one foot of water—at high tide they would be covered with about four feet. See analyses Nos. 13 and 14.

Dr. Klein reported upon these samples as follows, viz. :—

From layings ... ... 25 per cent. polluted.
,, pits ... ... 40 per cent. polluted.

The sale of Southwick oysters was accordingly prohibited in the London markets.

Dr. Newsholme, Medical Officer of Health for Brighton, was of opinion that the pits should be entirely done away with, and that the merchants should remove their beds further out. He believed that the under-current carried a large quantity of sewage back to the beds on the returning tide.

On the 21st June, 1904, a further inspection was made of these oyster layings and pits. It was ascertained that the District Council had had a new drain constructed, running under the layings and pits, carrying the sewage for about half a mile to the sea, the sewage being stored and let out at high tide. The pits appeared, however, to be in a dirty condition and contained a quantity of black mud.

The sewage of New Shoreham, which is about a mile distant from Southwick, is not treated, and discharged in its crude state, and it is quite possible for the sewage to find its way to these layings and pits on the flood tide.

A sample of mixed oysters from one of the pits was taken, consisting of Portuguese and Caen Bays; and also a sample of Portuguese oysters from the layings in the South Channel See analyses Nos. 214 and 215.

at low tide, which were submitted to Professor Klein for analysis, and both samples were reported upon; the Caen Bays showed no pollution, but both samples of Portuguese were polluted.

SHOREHAM.

See analysis No. 355.

On 5th December, 1907, Shoreham was visited. It was noticed from the Norfolk Bridge that two men were engaged in throwing water on some beds of mussels on the foreshore close to the bridge. A purchase was made of half a bushel of the large mussels, stated to have been picked specially for Brighton, which had been taken out of the River Adur the previous day from a place opposite, close to Norfolk Bridge.

It was ascertained from analysis that they contained abundance of sewage microbes, and in addition a sporing microbe distinctly pathogenic.

Dr. Newsholme, the Medical Officer of Health for Brighton, was seen, and in course of conversation he said he had no doubt but that mussels from Shoreham were polluted, as the beds were close to the sewer outfall; that several cases of typhoid were traceable to the consumption of mussels from Shoreham, and that he had caused the public to be warned against eating such mussels.

The Company prohibited the sale of Shoreham mussels in the London markets.

BOSHAM.

Bosham is situated midway between Chichester and Emsworth, which are about five miles apart.

The Bosham Dredgermen's Co-operative Society, Limited, are the owners of the oyster grounds, about four miles in length, which are situate in the Chichester and Bosham Channels respectively.

The Company's Inspector visited these layings on the 29th December, 1902. It was found that at a distance of about a mile and a quarter from one of the extremities of the layings the effluent outfall of Chichester discharged into Chichester Channel, and consequently had to pass over four-fifths of these layings on its way to the sea, and the remaining portion of the layings was exposed to pollution from other sources which were found to be existing. There were three storage ponds, of which two only were used for the storage of oysters for two or three days only, and which were covered at each tide.

The size of the ponds was 30 feet across and 18 inches deep, the sides were built up from the shore to that height. The oyster beds were covered at low water with two and a half fathoms, and at high tide with four and a half fathoms.

Near the storage ponds there were about eight drain pipes, through which passed dirty water only.

The attention of the Chairman of the Company was called to the close proximity of the ponds to the drains, and he expressed his willingness to remove the ponds half a mile lower down. The use of the ponds was eventually discontinued.

A sample of oysters was taken from the end of the layings four miles from Bosham and one from Emsworth Harbour. A second sample was taken one and a half miles from Bosham, and a third sample, which had only been there a few days, was taken out of one of the ponds. These were all submitted to Professor Klein for analysis, and found to be extensively polluted with sewage, and the sale of these oysters in the London market was prohibited.

See analysis No. 5a.

On the 8th January, 1903, a sample of oysters was received from the Bosham Dredgermen's Co-operative Society's oyster layings for analysis.

See analysis 5b.

These oysters were submitted to Professor Klein, and he reported that he found them polluted to the extent of 40 per cent.

On the 27th April, 1903, the Company's Inspector again visited Bosham, and discovered, in addition to the eight drain

outlets, 11 sewers and nine slop drains. A further sample of oysters was taken, together with a sample of the water, from approximately the same position as sample 5B was taken, also a sample of oysters and water from the northern end of the Rudder Rock layings, and a sample of oysters and water from the northern extremity of the company's layings, "Bosham Deep."

See analyses Nos. 101 to 106.

The above samples of oysters and water were submitted to Professor Klein for analysis, with the result that oysters Nos. 101 and 103 yielded b. coli communis but no b. enteritidis sporogenes, and oysters No. 105 yielded no b. coli communis and no b. enteritidis sporogenes, and neither of the three samples of water, Nos. 102, 104 and 106, could be considered to be polluted.

On the 11th June, 1903, the Fishmongers' Company wrote, regretting that their Inspector's report on the sanitary surroundings was not more in agreement with the results obtained by Professor Klein, and pointed out to the Bosham Society the necessity of urging the Chichester Corporation to complete their works.

On the 20th September, 1903, the Company's Inspector visited Chichester sewage works and found that fully six weeks would elapse before the system of the purification of the sewage from Chichester was in working order.

On the 2nd December, 1903, the Company's Inspector again visited Chichester sewage works, and found they were completed, and afterwards took samples of oysters and water from the layings of the Bosham Society, viz., (1) Native oysters from Bosham Deep, from the middle of the Company's beds at low water; (2) Native oysters from Rudder Rock layings at low water; (3) water from effluent of Chichester sewage works. These samples were submitted to Professor Klein for analysis on 3rd December, 1903, who found that both samples of oysters were not safe, and the water could not be considered as a fair effluent, and compared with a slightly diluted sewage.

See analyses 179, 180 and 181.

On 1st February, 1904, a sample of oysters (Solent Natives) was taken from a pit situate in Mud Creek, Bosham. This

See analysis No. 207.

sample was composed of oysters dredged from the layings of the Bosham Society, situate in Chichester Channel, on 18th January, 1904, and relaid in the above-mentioned pit on the evening of the same date. This sample was submitted to Professor Klein for analysis, who found the oysters were not polluted.

It therefore appeared that the sanitary conditions had improved.

EMSWORTH CHANNEL LAYINGS.

The Emsworth Dredgermen's Co-operative Society, consisting of the local fishermen of Emsworth, have fishing rights over the old Emsworth Native oyster grounds, which begin 3½ miles from the Emsworth foreshore to West Point, Hayling Beach.

In August, 1903, Dr. Lockhart Stephens reported that these grounds had not been worked for over two years, and that the sewage from Emsworth did not reach below three-quarters of a mile of the fishery.

At the request of Dr. Lockhart Stephens on behalf of the fishermen, the Company's Inspector on the 18th of September, 1903, took a sample of the oysters from these layings, about 2½ miles from the Emsworth outfalls, which were taken about an hour after high water in five fathoms of water. These oysters were submitted to Professor Klein for analysis, and were found to be polluted, and their sale was accordingly prohibited in the London market.

See analysis No. 147.

EMSWORTH, HANTS.

At Emsworth the oyster layings and several pits—each about 4 feet deep and 30 feet square, owned by Mr. J. D. Foster—were inspected in December, 1902.

The main sewage outfall from the town enters the channel only about 20 yards distant from the extremity of the oyster pits.

See analysis No 1.

A sample of oysters and water from the pits taken on 17th December, 1902, gave, on analysis, the following result, viz., practically the water and oysters alike were both contaminated with sewage.

These oysters were from the same pits and similar to those supplied for the Winchester and Southampton banquets referred to in the introduction.

The sale of Emsworth oysters was accordingly prohibited in the London markets.

In consequence of information received by the Company that Mr. Kennett was consigning oysters taken from the pits at Emsworth to the London and Provincial markets for sale, the Company's Inspector on the 11th of June, 1903, proceeded to Portsmouth, with reference to some oysters an Inspector had seen that morning taken from Mr. Kennett's pits at Emsworth, and consigned to a Mr. W. Lewis, 41, Arundel Street, Portsmouth.

Mr. Lewis was interviewed by the Company's Inspector in company with Chief Inspector Bell, of Portsmouth, when Mr. Lewis gave the oysters up to Inspector Bell, together with some cockles which had also been sent with the oysters from Emsworth. Mr. Lewis stated he had been dealing with Mr. Kennett for some weeks, and that Mr. Kennett had informed him that the oysters he was sending him were from the Hayling layings.

See analyses Nos. 126 and 127.

The Company's Inspector retained samples of the oysters and cockles, and forwarded them to London for analysis, which were handed to Professor Klein, and both samples were found to be polluted.

The Company's Inspector ascertained from a Mr. Kay, residing in Commercial Road, Portsmouth, that he had received a bag of 100 oysters from Mr. Kennett, and had refused to

take delivery. Mr. Kay stated that on Monday, 8th June, he went to Emsworth for 100 oysters and saw them taken from the pits, which he could not understand.

The carrier was overtaken at Havant, and two bags of oysters, with which he was returning to Emsworth, were taken possession of by the Company's Inspector and Inspector Mant.

The result of the analysis by Professor Klein was duly reported to the Medical Officer of Health for Portsmouth, and that gentleman had the remaining portion of the oysters received from Mr. Lewis condemned by a magistrate, in accordance with the provisions of the Public Health Amendment Act.

With a view of proceedings being taken against Mr. Kennett, the Medical Officer of Health considered it desirable that another sample of the oysters condemned should be analysed, and accordingly nine oysters were submitted to Professor Klein on the 18th June, 1903, who reported that they were strongly polluted by sewage, and that he considered them unfit for food and potentially dangerous.

See analysis No. 128.

This result was duly reported to Dr. Fraser, Medical Officer of Health for Portsmouth, but no proceedings were instituted by the Corporation of Portsmouth against Mr. Kennett.

On 11th February, 1904, the Company's Inspector again visited Emsworth, and inspected the storage ponds, about 60 in number, which were situated on the foreshore at Emsworth (in the occupation of Mr. J. D. Foster and Mr. Kennett respectively), and within a few yards of the Emsworth main sewer outfall.

It was clearly observable, even while the tide was well on the flood, that the sewage travelled along the ponds' side of the foreshore, and that it settled in the gullies wherein are the intakes of the ponds. It was also clear that the south-western pits were exposed to the reception of a still greater quantity of sewage.

In 1904 Mr. J. D. Foster instituted proceedings in the High Court of Justice against the Urban District Council of

Warblington, for an injunction to restrain the Council from placing or maintaining their sewer outfalls in the neighbourhood of his oyster storage beds, on the foreshore of Emsworth Creek, and further claimed damages for loss and injury to his business caused by the alleged nuisance. The trial lasted for several days, and evidence was given by the Company's Inspector and Professor Klein in November, 1904, and was continued in January, 1905, before Mr. Justice Walton, and concluded on the 12th January, when Judgment was reserved.

On the 23rd January, 1905, Judgment was given for the plaintiff, the learned Judge stating in his opinion the plaintiff's oyster beds had been unfit for the storage of oysters for some considerable time, owing to the sewage discharged from the defendants' sewer, and that the defendants were responsible for the damage which has been occasioned, but he did not think he ought to grant an injunction for the reasons given in the recent case of The Earl of Harrington *v.* The Mayor, &c., of Derby. The amount of damages was by consent reserved for further consideration. Stay of execution was granted, pending an appeal to the Court of Appeal.

The appeal of the Urban District Council of Warblington was taken before the Lord Justice Vaughan Williams, Lord Justice Stirling and Lord Justice Fletcher Moulton, and on the 3rd of April, 1906, was dismissed with costs.

On the 14th May, 1906, the matter again came before Mr. Justice Walton to assess the damage, when Mr. J. D. Foster was awarded the sum of £850.

HAYLING ISLAND.

On the 8th January, 1904, the South Hayling oyster ponds and layings, in the occupation of the Seasalter & Ham Oyster Fishery Company, were inspected.

The layings are situate in a creek called "Cocklerythe," and are about one and a half miles in extent, the width at high water being about 100 yards, and covered with about

14 feet of water, and at low water are nearly dry, a small amount of water being kept back by barriers and banks for the purpose of keeping the oysters covered.

Emsworth is situate about six miles to the north of this creek, and water flows into the creek from the Emsworth Channel. It was stated by Mr. William Gann that the tide on coming down the Emsworth Channel met the flow of water coming out of the creek, which was carried out to sea, and that the first two hours of the incoming tide from the sea went straight up the Emsworth Channel and did not enter the creek. After that lapse of time the tide entered the creek, so that it could be fairly stated that the water entered the creek direct from the sea. With regard to the drainage in the vicinity of these layings, it was found that the cesspool system was adopted at every house in the neighbourhood. These were watertight constructions stated to be carefully overlooked by the Local Authority, and no sewage was observed to find its way into the creek; the only drainage appeared to be surface water from the adjacent lands.

A sample of water was taken from the creek at dead low water, where there was a depth of about two feet; a second sample of water about an hour and a half before high water, where there was a depth of about eight feet; and a sample of oysters—"Princesses," from No. 1 laying—which had originally been laid down at Whitstable, and received by Mr. Gann from London, and relaid in the creek on the 23rd December, 1903, for 16 days.

See analyses Nos. 199, 200 and 201.

These samples were submitted to Professor Klein, who found that the water (No. 199) might be considered clean; that the water (No. 200) was passable; and that the oysters (No. 201) examined might be considered quite passable.

LANGSTONE CHANNEL.

The oyster layings in Langstone Channel extend from Hayling Island (Langstone) Railway Bridge towards the Ferry between Hayling Island and Eastney, and is a public fishery.

The Company's Inspector visited the layings in December, 1903, and reported that there was danger of pollution, owing to the possibility of the overflow from the sewage tanks of Portsmouth finding its way to the channel.

The Company communicated this to Dr. Lockhart Stephens, the Medical Officer of Health, on the 4th of December, 1903, suggesting that samples of oysters should be taken from the harbour and channel and analysed, at the expense of his Council. A letter was also written, to the above effect, to Dr. Fraser, the Medical Officer of Health for Portsmouth, which was submitted to the Sanitary Committee on the 6th December, 1903, but no request was received by the Company to submit a sample of the oysters to Professor Klein for analysis.

LANGSTONE HARBOUR.

On the 20th December, 1904, the Company's Inspector dredged, at low water, from the public grounds in Langstone Harbour, a sample of Native oysters, from about midway between the "Ferry" and the "Sword Sand," at a distance of about 600 yards from the Portsmouth sewer outfalls.

See analysis No. 230.

The above sample was submitted to Professor Klein for analysis, who found they were polluted.

The Company's Inspector found that the Portsmouth Corporation were in course of constructing extra tanks for the storage of sewage, which, when completed, would more than double their accommodation.

THE MILTON OYSTER FISHERY.

On the 22nd December, 1904, the Company's Inspector visited and inspected these layings, which are situate under three miles from the entrance to the harbour, in a channel branching from Broom Channel, which runs along the western side of Langstone Harbour, known as "Russell Lake," and are in the occupation of Mr. H. E. Russell.

The layings in the channel have not been used since the Spring of 1903. Mr. Russell uses the ponds which are situate between the two extremities of the layings opposite the "Island." The area of the ponds on the western side, which are used for the preparation of oysters for market, is over an acre, and the area of the ponds on the eastern side is over an acre and a quarter. The ponds have a solid bottom, and present a cleanly appearance. The bottom of the ponds are higher than the bed of the channel, and although the tide commenced to flow into the harbour at 9 a.m., water did not commence to flow into the lower pond until 11 a.m., and into the remaining ponds at 1 p.m.

The Company's Inspector failed to discover anything of a nature likely to be injurious to the fishery by way of pollution in the neighbourhood of the layings.

On the 29th December, 1904, the Company's Inspector took a sample of Solent Natives from one of the "market" ponds, stated to have been placed there over a month previously, and also a sample of Solent Natives from No. 5 pond (lower pond), stated to have been relaid there in April, 1904. These two samples were submitted to Professor Klein for analysis, who found the oysters were not polluted.

See analyses Nos. 233 and 234.

HAMBLE RIVER, SOUTHAMPTON.

On the 19th September, 1903, the Company's Inspector visited the layings of Mr. Sidgwick, of the "Bugle Inn," Hamble, which were situated in the River Hamble, immediately adjacent to the Ferry. Several very foul outlets were draining into the river from the village. A sample of the oysters was taken and submitted to Professor Klein for analysis, who found that the majority of them contained mud inside the shell, and that two out of eight contained bacillus coli communis in numbers.

See analysis No. 148.

The sale of these oysters was prohibited in the London market.

WARSASH.

See analysis No. 235.

On the 8th of March, 1905, the Company's Inspector visited the Warsash Oyster Ponds, situated on the foreshore, opposite the "Rising Sun" Public-house, in the occupation of Mr. E. Buckett. The ponds were 13 in number, and nine of them were found to be in use for the storage of oysters. A sample of "Solent Natives" was taken from two of the ponds, which had been placed there for about two months. From an inspection of the surroundings there did not appear to be any pollution by sewage, the sewer referred to in Dr. Bulstrode's report having been done away with.

The above sample of oysters was submitted to Professor Klein for analysis, who found that of 10 oysters examined none contained b. coli com., one oyster contained some coli-like microbe, not b. coli com. Of four oysters specially examined, none contained streptococci; of four oysters specially examined, none contained spores of b. enteritidis sporogenes.

ISLE OF WIGHT.

In the month of February, 1903, the Company's Inspector went to the Isle of Wight to inspect the various oyster layings and pits.

MEDINA RIVER.

See analysis No. 184.

It was ascertained that the oyster layings in the Medina River were in the occupation of Mr. Max Ullmann, that no oysters had been placed on the market therefrom since the 2nd October, 1902. Enquiries were made into the many sources of pollution affecting this river, with the result that left no doubt as to the utter unfitness of the "Medina" as a place for relaying oysters.

On the 10th December, 1903, a sample of cockles collected from the bank of the Medina River was received from East Cowes and submitted to Professor Klein for analysis, who found

that out of eight cockles two had b. coli communis in small numbers and one other had some other kind of b. coli.

NINGWOOD CREEK, NEWTOWN.

On 28th February, 1903, the layings of Messrs. Paskin & Son, at Ningwood Creek and Clamerkin Lake, near Newtown, were inspected.

It was ascertained that no drainage of any kind was allowed to pass into the creeks, and every precaution was taken by the Lord of the Manor to maintain their purity.

A sample of Natives was dredged at high water which was afterwards submitted to Professor Klein for analysis, and found by him not to be polluted and very clean. See analysis No. 83.

WOOTTON BRIDGE AND FISHBOURNE.

On the 28th February the pits at Wootton Creek in the occupation of Mr. J. Chatfield and Mr. Frank Young were inspected.

The pits in question, about 12 in number, were found to be excavated on the foreshore, and adjacent to two sewer outfalls, one being about 80 yards to the north of the pits and the other about 100 yards to the south; these outfalls discharged the sewage of most of the houses (about 100 in number) in Wootton village. There was also a school in the village with an average attendance of 151 scholars. It was noticed that there was a small outfall also opposite to Mr. Young's pits.

A sample of oysters (Solent Natives) was taken from one of Mr. Chatfield's pits, and a sample from one of Mr. Young's pits.

Both samples were submitted to Professor Klein for analysis, and were found to be in such a condition as to make it desirable to obtain further samples. See analyses Nos. 84 and 85.

On the 11th March, 1903, a further visit was made by the Company's Inspector, when additional samples of the same class

of oysters were taken from the pits of Mr. Chatfield and Mr. Young, and afterwards submitted to Professor Klein for analysis, which were found by him to be polluted to the extent of 25 per cent. The sale of these oysters in the London market was accordingly prohibited.

See analyses Nos. 89 and 90.

POOLE HARBOUR.

HAMWORTHY STORAGE PONDS.

The Company's Inspector visited Poole Harbour on the 12th March, 1903.

It was ascertained that the Corporation of Poole had abdicated its jurisdiction over the oyster fishery of the harbour, and that it was open for anyone to dredge for oysters.

The Storage Ponds or Pits are situate on the foreshore of Hamworthy, and are in the occupation of Mr. Cole and Mr. Henderson.

A large quantity of sewage is discharged into Poole Harbour, and in addition there are a number of drain and sewer outfalls, some of the drains discharging not many yards from the storage pits; and there could be seen at low water a sewer discharging itself at a point about midway between the two pits, which is connected with the Royal Naval Reserve Battery. The situation of the pits appeared to be a very undesirable place for the storage of oysters.

See analysis No. 91.

See analysis No. 92.

A sample of French relaid oysters was taken from Mr. Henderson's pit, and also a sample of Native and American oysters from Mr. Cole's pit, which were submitted to Professor Klein for analysis, who found that the French relaid oysters were polluted, and the Native and American were not polluted.

See analyses Nos. 93 and 94.

Further samples of Native and American oysters were taken from Mr. Cole's pit and submitted to Professor Klein on the 20th March, 1903, and were also found not to be polluted.

Looking to the general surroundings, the Company advised Mr. Henderson to abandon the use of the pits until the Corporation of Poole had carried out drainage alterations.

On the 22nd of September, 1903, the Company's Inspector again visited the Hamworthy Storage Ponds, and found the drain connected with the Royal Naval Reserve Battery had been removed, and that the Poole Corporation were pressing the owners of cottages to remove the local drains.

On January 24, 1908, a sample of oysters was taken from Poole Channel, which had been previously dredged from opposite Saltburn Pier, in Poole Harbour, by the Chief Sanitary Inspector at Poole, and relaid in the Poole Channel for seven days. See analysis No. 357.

The above sample was submitted to Professor Klein, who reported, upon analysis, the oysters were unclean.

On the 8th December, 1908, the Company's Inspector visited Birmingham in consequence of a scare in relation to shellfish generally. A sample of Natives was taken from the shop of Mr. William Pierce, No. 50, John Bright Street, Birmingham (No. 388). The oysters in question had been received by him from Mr. G. Stout, of Stanley Road, Poole, on the 1st of December. Also a sample of Natives was taken from Mr. A. Hunting (No. 389), Nos. 64 and 65 Stands in the Market Hall, Birmingham. These oysters had also been received by him from Mr. G. Stout, of Poole, on the 4th December, and were believed to have been taken from the Poole Channel. See analyses Nos. 388 and 389.

Both samples were submitted to Professor Klein, who reported that sample No. 388 was not a satisfactory sample, being stale, but from results obtained the oysters were only slightly polluted; but with regard to sample No. 389, the oysters were dangerously polluted. It should here be mentioned that the Inspector of the Birmingham Corporation also took a sample of the same class of oysters from Mr. A. Hunting on the 8th December, and submitted same to Dr. Buchan, the Assistant to the Medical Officer of Health, Dr. Robertson, who found that they were grossly contaminated, and therefore confirmed Professor Klein's report.

In consequence of the above reports, the Company's Inspector again visited Poole Harbour on the 19th and 20th March, 1909, and inspected the sanitary conditions. He found that the

sewage of Poole was discharged in its crude state by means of two outfalls outside the Harbour, some distance below low water mark, off Poole Head, within one sea mile of the entrance to the Harbour, which discharges the largest volume, and of Branksome Chine respectively.

During a considerable portion of each flood tide, the crude sewage discharged from these outfalls is carried along the shore into the Harbour, and this was clearly demonstrated by an inspection of the beach by the Ferry at the entrance to the Harbour. There can be no doubt that the oyster beds situate at the inside entrance to the Harbour are unsafe and dangerous.

With a view of calling public attention to this matter, the Fishmongers' Company instituted proceedings against Mr. A. Hunting of Birmingham, for exposing for sale oysters which were unfit for human food, and against George Stout of Poole, for aiding and abetting. The case was heard at the City Police Court, Birmingham, on 2nd April, 1909, before Sir Walter Fisher (Chairman), and a Bench of Justices, and both defendants having pleaded guilty, the Chairman stated that as the prosecution did not press for a penalty against Mr. A. Hunting, he would be discharged, but George Stout would be fined £5 and 10s. 6d. Court fees, or in default, one month's imprisonment; and expressed the opinion that the local authority of Poole should take every possible means of making the fact of the contamination known.

See analysis No. 410.

On the 20th March, 1909, a sample of oysters was forwarded for analysis by Dr. Alford, the Medical Officer of Health for Taunton, which had been taken from the shop of Mr. Adams, in Taunton, on the previous day, the oysters having been received by him from Poole, on the 18th March. The sample was submitted to Professor Klein, who found the oysters "not clean."

The result was notified to Dr. Alford, who reported the matter to the Health Committee, who, however, were not disposed to take any action in the matter.

See analysis No. 411.

On the 21st March, 1909, a sample of mussels was taken by the Company's Inspector off the rocks at low water, at a point

(approximately) midway between the Boat House and Old Harry, in Studland Bay, and submitted to Professor Klein for analysis, who reported "mussels doubtfully clean."

N.B.—This sample was taken with a view to ascertaining whether Studland Bay was free from pollution by sewage.

RIVER EXE.

On 14th October, 1903, the Company's Inspector took a sample of mussels from a consignment addressed to Messrs. Baxter & Son, Billingsgate Market. The mussels were stated to have been taken from Starcross and Lympstone layings, in the River Exe, near Exeter. The sample was submitted to Professor Klein for analysis, and all the mussels were found to be polluted.

See analysis No. 153.

On 9th September, 1907, a sample of mussels which had arrived from Lympstone, and a sample of mussels from Starcross, were taken from Mr. G. H. Hammond's premises in Pudding Lane. They were submitted to Professor Klein, who found that both samples were decidedly unclean.

See analyses Nos. 337, 338.

On the 14th September the mussel grounds in the River Exe, which are situate within a couple of miles of Topsham, and extending down the river to Starcross, were visited in company with the Sanitary Inspector of Lympstone and some of the local fishermen.

See analyses Nos. 339, 340, 341, 342.

It was evident that certain of the mussel beds were utterly unfitted for preparing mussels for market, owing to their proximity to sewer outfalls, and, with a view of ascertaining whether the beds which were sanitarily more favourably situated produced fairly clean products, further samples were taken.

The sewage of Exeter was found to be septically treated, and the effluent discharged into the Alphine Brook, which merged into the Exe a short distance below Countess Wear.

The places in close proximity to the mussel beds, which undoubtedly contaminated them, were found to be Topsham, Lympstone, and Starcross, respectively.

The following samples were taken:—

No. 339.—From Knob Ground.
No. 340.—From Scotts Ground off Powderham.
No. 341.—From back of the ridge opposite Lympstone.
No. 342.—From the bottom of the ridge opposite Courtlands.

The above samples of mussels were submitted to Professor Klein, who reported as under:—

No. 339.—Decidedly unclean.
No. 340.—Of eight mussels four had b. coli communis. Of two specially examined, both had enteritidis spores.
No. 341.—Decidedly unclean.
No. 342.—Not clean.

Mr. Wright, Billingsgate Market, was informed on the 18th September he could sell the Exe mussels on his undertaking to place in each bag a note that the mussels must be cooked before being eaten.

See analysis No. 344.

A sample of mussels was collected at various points along the "back of the ridge" opposite Lympstone, on 28th September, 1907, which was submitted to Professor Klein, who found the mussels decidedly unclean.

Mr. Bean was asked to place in his waters at West Mersea some polluted mussels from the River Exe, for the purpose of ascertaining whether mussels placed in pure surroundings would cleanse themselves, and if so in how many days.

See analysis No. 349.

On the 17th October, 1907, a sample was taken from Lympstone, and after being in the West Mersea waters for seven days was submitted to Professor Klein, who on analysis pronounced the mussels as passable.

See analysis No. 350.

Another sample was taken on the 7th November, placed in Mr. Bean's waters, and allowed to remain 28 days. The result of this analysis was fairly satisfactory.

Samples of mussels and mud were taken on 12th November, 1907, from the centre of the "Ridge," opposite Lympstone, with the object of endeavouring to select an unpolluted area upon which the Lympstone and Starcross mussels could be relaid to purify themselves, and they were submitted to Professor Klein for analysis, who found No. 351 (mussels) —"unclean." No. 352 (mud)—"the mud cannot be considered clean, but none the less, it is not to be rejected as grossly polluted with sewage deposit." See analyses Nos. 351, 352.

On the 13th November, 1907, the Company's Inspector took a sample of water from the centre of the "Ridge" opposite Lympstone. It was high water at Lympstone 11.15 a.m., and the water was taken at 3.40 p.m. This sample was submitted to Professor Klein for analysis, who reported that the water was not exactly clean, but as surface water was passable; it was about the same, if not better, as the water of the Upper Thames, *i.e.* above the intake of the Water Companies. See analysis No. 353.

On the 26th November, 1907, the Company wrote the several mussel merchants at Lympstone, Starcross, and Powderham, that unless the mussels were relaid in purer surroundings they were not in a fit state for consumption; and from the result of Professor Klein's report on sample 353, and taking the sanitary surroundings into consideration, the Company as a temporary measure suggested that the planters should relay their mussels for at least seven days before marketing them at about the middle of the ridge opposite Powderham Castle, being that area of the ridge opposite Lympstone which is the first on the ebb tide to become dry, which so far as could be ascertained did not run the same chance of pollution as the other parts of the river. The merchants were referred to Mr. Quick, the Sanitary Inspector of Lympstone, who would point out the grounds selected for purposes of relaying.

A letter was also written to the Clerk of St. Thomas's Rural District Council, Exeter, drawing the Council's attention to the pollution of the River Exe from Topsham, Lympstone, Starcross, &c., in the hope that it might be possible, in the interest of the public health and the fishermen, for the Council to take action to improve the condition of the river.

See analysis No. 375.

On the 11th August, 1908, a sample of mussels was collected from the Pole Sands, opposite the Coastguard Station at Exmouth, which was submitted to Professor Klein, who found in the result no pathogenic microbe.

See analyses Nos. 376, 377 and 378.

On the 12th August, 1908, a sample of mussels was taken from a bag consigned from Powderham, by Scott, to Messrs. Baxter & Son, Billingsgate Market; also a sample of mussels from two bags consigned from Lympstone, by Clapp, to G. H. Hammond, Billingsgate Market; and a sample of mussels from two bags consigned from Lympstone, by Venus, to G. Tabor & Son, Billingsgate Market. All three samples were submitted to Professor Klein, who found no pathogenic microbe in any of the samples.

The Sanitary Inspector at Lympstone is occasionally requested to furnish certificates testifying that the relaying on the centre of the Ridge is being carried out.

TEIGNMOUTH—RIVER TEIGN.

See analysis No. 346.

A sample of mussels was taken on 4th October, 1907, from the premises of Messrs. George Tabor & Sons, in Monument Street, out of a bag stated to have reached them the same morning from Mr. Sealey, Teignmouth. Professor Klein, on analysis, found the mussels were not clean.

On the 18th January, 1909, the Company's Inspector visited Teignmouth and inspected the mussel layings—River Teign. It was ascertained that a large number of men were engaged in the industry, and that the mussels were mostly consigned to Birmingham and the Midlands. The mussels were bred all over the lower reaches of the river, but the mussels consigned to the markets were mostly taken from a stretch of mudbanks in mid-river, extending from Shaldon Bridge upwards.

The River Teign was found to be exposed to gross pollution, the crude sewage of Teignmouth and Shaldon (population 8,636), also Newton Abbott (population 13,400), being discharged into it; in addition, Teignmouth Harbour contributed

to the pollution attendant upon the presence of a large number of steamers and sailing vessels. It was quite apparent that this river was utterly unfit for preparing mussels for market.

In 1903 Dr. Piggot, the Medical Officer of Health for Teignmouth, stated that he had first directed attention to the matter in 1893, in consequence of the death of a London visitor due to cockles consumed in Teignmouth.

In 1905 the Medical Officer of Health for Torquay referred in his Annual Report to ten cases of enteric, three of which were distinctly traceable to the consumption of polluted shell fish obtained from the River Teign.

Dr. Mapleton, Medical Officer of Health for Newton Abbot, reported eighteen cases of enteric in 1905, showing considerable increase due to two groups of cases associated with the eating of shell fish.

The Company are in correspondence with the fishermen and authorities, with a view to finding a suitable place where shell fish grown in the river may be quarantined.

RIVER YEALM, YEALMPTON, S. DEVON.

On the 7th April, 1903, Lord Auckland, proprietor of the oyster layings in the River Yealm, forwarded to the Company a sample of native oysters and water taken from the above layings, with a request that they should be submitted to Professor Klein for analysis. This request was complied with, and in the result Professor Klein reported that there was no bacillus coli of any kind in any of the oysters examined, and the water was not in any way polluted.

See analyses Nos. 99 and 100.

On the 10th of September, 1903, the Company's Inspector visited the layings and found that no sewage was discharged into the River Yealm, and that the surroundings were of a satisfactory nature.

STONEHOUSE CREEK, PLYMOUTH.

The Company's Inspector, on the 10th of September, 1903, inspected an oyster pit used by Mrs. Tyacke at Stonehouse Creek for the storage of oysters received from Helford. A sample of oysters was taken and submitted to Professor Klein for analysis, with the result that he found they were polluted to the extent of 60 per cent.

See analysis No. 140.

The sale of oysters taken from this pit was prohibited; sewage was being discharged within half a mile of the pit.

SALTASH.

See analysis No. 255.

A sample of Cornish oysters was taken on the 7th February, 1906, out of a bag consigned for sale to Messrs. Baxter & Sons, Billingsgate Market, by a man named Dunsford, of Saltash, and stated to have been taken from layings in the River Lynher. The sample was submitted to Professor Klein for analysis, who found that the oysters were not clean.

The Company prohibited the sale of these oysters in the London market.

In March, 1906, the Saltash Oyster Fishery was inspected with a view to ascertaining whether a place could be found for oysters to be relaid for cleansing purposes.

The principal oyster fisheries at Saltash are in the Rivers Lynher and Tamar, which flow into the Hamoaze, and the fishermen are only permitted to dredge oysters during February and March.

The sources of pollution to which the oyster grounds are exposed are many. Direct into the Hamoaze flows the crude sewage of Devonport (population 76,000) and other places, and it may be taken that the Hamoaze is directly the recipient of enormous quantities of crude sewage.

The population of Saltash is 3,500, the sewage is untreated, and the town's sewage outfall is situate beneath the Suspension Bridge at Saltash, on the River Tamar.

A sample of Saltash Natives out of the River Tamar, opposite Weir Point, was taken on the 9th March, 1906. See analysis No. 259.

The sample was submitted to Professor Klein for analysis, who found that the oysters were clean.

Weir Point, River Tamar, appeared to be the most likely place to relay oysters for cleansing purposes.

On 23rd January, 1909, the Company's Inspector called at the office of the Medical Officer of Health for Devonport, Dr. O. Hall, and there had an interview with his assistant, Dr. Gill, who stated that cases of enteric from time to time had been reported to them, and were attributed to the eating of cockles gathered locally. It was ascertained from the local tradesmen that the cockles sold by legitimate traders were obtained from Kings Lynn, and were received cooked and heavily salted, and that the cockles suspected of doing mischief were gathered by men out of work and hawked by them about the town. A letter was written to Dr. Hall on the 11th of February, 1909, suggesting that the men should be cautioned not to gather the cockles, and action should be taken to prevent their doing so.

FAL, PENRYN and TRURO RIVERS.

FALMOUTH, FLUSHING AND PENRYN.

On the 29th January, 1903, Messrs. Hole & Dodd forwarded to the Company for analysis a sample of Native oysters taken from their layings on 27th January, 1903, near Flushing, Falmouth. The sample was submitted to Professor Klein, who reported that the oysters were extensively polluted. The sale of these oysters was prohibited in the London markets. See analysis No. 39.

On 20th March, 1903, a sample of Native oysters, which were stated to have been taken from the above layings, and relaid for a week at Stangate Creek, was submitted to Professor Klein, who found that one out of eight oysters only contained b. coli communis. See analysis No. 95.

See analysis No. 98.

On the 2nd of April, 1903, a further sample of Native oysters, which had originally been taken from the layings near Flushing, and relaid at Stangate Creek for 20 days, was submitted to Professor Klein for analysis, who reported that none of the oysters contained either b. coli communis or b. enteritidis sporogenes.

On the 12th May, 1903, the Company's Inspector visited Falmouth, and inspected the layings in the Penryn River, in the occupation of Messrs. Hole & Dodd, Mrs. Dash and Mr. Mead.

The sewage of Penryn was found to be discharged in a crude state into the Penryn River. It may be taken that the present layings in the Penryn River are very unfitted for the relaying of oysters.

The sewage of Falmouth is conveyed into tanks situate at the Market Strand Quay. At one time the tanks were used for the chemical treatment of the sewage, but on date of visit were found to be simply settling tanks, the liquor being allowed to discharge itself into the harbour at a distance of only a few yards from the layings, the sludge being periodically taken out to sea.

The drainage of Flushing, a village at the mouth of the Penryn River, was, more or less, being discharged into Falmouth Harbour.

See analyses Nos. 117 and 118.

A sample of Cornish oysters was taken at low water from the layings of Messrs. Hole & Dodd and Mrs. Dash, in the Penryn River, and submitted to Professor Klein for analysis. It was found that one in eight of Messrs. Hole & Dodd's sample had b. coli, but not b. coli communis; and that with regard to Mrs. Dash's sample, two in eight had b. coli communis, and one further oyster had b. coli of other kind, and spores of b. enteritidis sporogenes.

See analysis No. 119.

A sample of water was also taken at dead low water from Mr. Mead's layings, situate at Green Bank Pier end, in the Penryn River, and submitted to Professor Klein, and found not to be polluted.

The sale of oysters from Mrs. Dash's layings was prohibited in London.

On the 8th February, 1904, the Company's Inspector again visited the oyster layings in the Penryn River, and inspected the sources of pollution to which these layings were exposed, and found the conditions the same as in May, 1903.

Two samples of Native oysters were taken at low water from Mr. Mead's layings—one from the centre of the lower grounds and the other from the "bar." The oysters in question had been on the grounds for some time. The above samples were submitted to Professor Klein for analysis, who found both were polluted. See analyses Nos. 209 and 210.

On the 21st March, 1904, a sample of French relaid oysters, taken from Mrs. Dash's layings in the Penryn River (similar to sample No. 118), and relaid for 21 days in Gillan Helford River, was submitted to Professor Klein for analysis, who found they were free from pollution. See analysis No. 211.

On the 26th October, 1904, a sample of Native oysters was taken from a spot as near as possible to Green Bank Pier, and adjoining Mr. Mead's layings, and submitted to Professor Klein for analysis, who found they were polluted. See analysis No. 226.

On the 13th November, 1905, six oysters were received from Mr. Mead and forwarded to Professor Klein for analysis, who found that two of the oysters contained b. coli communis (one in abundance, the other less so), and of four of the oysters specially examined three contained streptococci, and of two examined specially none contained b. enteritidis sporogenes. See analysis No. 244.

The above samples were stated by Mr. Mead to have been taken from his grounds in the Penryn River from an enclosed pond where they had been relaid for 21 days.

The Company's Inspector on the 21st December, 1905, took a further sample of oysters known as "Falmouth Natives" from the enclosure selected by Mr. Mead as an experiment, which was stated to have been relaid there for six weeks, and had been formerly in the Penryn River for ten months, and originally dredged from the Falmouth public grounds. See analysis No. 248.

This sample was submitted to Professor Klein for analysis, who found that the oysters were decidedly not clean.

The place selected by Mr. Mead was a loose, sandy, rising beach, through which ran a spring or stream of clear, fresh water, and was situate midway between Bozer Cellars and Green Bank Quay, and it was from this place that the two before-mentioned samples (Nos. 244 and 248) were taken.

See analysis No. 254.

A sample of Falmouth Natives was taken on the 27th January, 1906, from Messrs. Hole & Dodd's layings at Upper Point, close by Little Falmouth, and relaid in Penryn River in the previous October. They were found on analysis to be decidedly unclean.

See analyses Nos. 256 and 257.

On the 14th February, a sample of Falmouth Natives was taken out of an improvised pit, situate on a point between Little Falmouth and Sailor Creek in the Penryn River, where only at fairly high tides water would get into it, and at the lowest neap tides the water would not reach it. A further sample was taken on the 21st of that month. The oysters had been in the pit for seven days and 15 days respectively, and had been taken from the Penryn layings where they had been since the previous October. The analyses showed that the oysters were "doubtfully clean."

See analysis No. 258.

Mr. Mead's layings, situate between Bozer Cellars and Greenbank, were again visited on the 26th February, 1906, and a sample of oysters, which had been placed in a box raised off the beach so that the neap tides only just covered them, was taken. The box was located close to the Bozer Cellars end of the ground, and the oysters had been in the box 21 days. They also proved on analysis to be unclean.

The Company having received information that Falmouth Natives which were polluted, were being consigned from Falmouth to Ostend in the close season, enquiry was made of Dr. Thomas, the Medical Officer of Health for Stepney, within whose jurisdiction the oysters would be deposited *en route* to the Continent, and in consequence of information obtained, the Company's Inspector, accompanied by Inspector Adams

proceeded on the 4th August, 1906, to the Goods Station in Commercial Road, where were found stored in a van marked "Ostend," six barrels and four cases, which were found to contain "Falmouth Natives." At the request of the Company's Inspector, Inspector Adams detained the whole of the consignment. After the Inspector had complied with the requirements of the London Public Health Acts, the oysters were removed to the Stepney Borough Council's Depôt, where three samples were taken, viz., two made up from three of the six barrels and one made up from two of the four cases, which were submitted to Professor Klein the following morning. He reported that he had examined ten oysters of each sample, and found that each contained abundance of b. coli communis, and in his opinion the oysters were grossly polluted with sewage or other filth.

See analyses Nos. 280, 281 and 282.

Professor Klein's Report was handed to Dr. Thomas, on Monday, 6th August, who, with Inspector Adams and the Company's Inspector, attended at the Thames Police Court and made application before the Magistrate for an order for the destruction of the oysters. The Magistrate adjourned the application in order that Professor Klein should give evidence, and on the following morning, when the application was renewed, the Magistrate, having heard Professor Klein, made an order for the destruction of the oysters seized.

From subsequent enquiries it transpired the oysters had been sold by Mr. Mead of Falmouth to Messrs. Janson, Ostend, and became their property the moment they were handed over to the Railway Company at Falmouth.

Dr. Thomas went over to Ostend, and in company with the British Vice-Consul had an interview with the consignees, who stated that they were not aware the oysters in question were from a polluted place, otherwise they would have had nothing to do with them, and they had received no intimation whatever from the vendor that the oysters were from a place exposed to pollution.

The matter was brought before the Public Health Committee of the Stepney Borough Council, who decided to take no further action.

ST. MAWES.

On the 13th May, 1903, the Company's Inspector visited St. Mawes and inspected the oyster layings situated on both sides of the Porthcuel River in the occupation of several fishermen. From the foreshore it could be seen that there existed several sewers and drains, but these were some distance from the layings. A sample of Cornish oysters was taken from the layings in the occupation of Messrs. Greet & Green at low water, and submitted to Professor Klein for analysis, who found the oysters to be only slightly polluted.

See analysis No. 120.

FAL RIVER.

See analyses Nos. 290, 291 and 292.

Mr. Louis Joubert of Plymouth, forwarded to the Company on the 24th August, 1906, three samples of oysters which were taken on the previous day. Sample No. 290 was dredged in the Carrick Road and relaid at Turnaware; No. 291 dredged and relaid at King Harry Passage; and No. 292 dredged in the Carrick Road and relaid at St. Just, Carrick Road. Professor Klein reported that no certificate of "clean oysters" could be furnished to any of these samples.

TRURO RIVER.

On the 14th May, 1903, the Company's Inspector visited Truro, and ascertained that the sewage of the City was discharged into the River Truro in a crude state.

A large number of oysters belonging to various fishermen were relaid in the river and the creeks abutting, no oysters being despatched to market from layings nearer Truro than the southern side of Malpas Ferry.

See analyses Nos. 121 and 122.

A sample of Cornish oysters was taken from the layings of Mr. William Allan, just below Malpas, at low water, and also a sample from the layings of Mr. John Penna, close to the mouth of the river at low water.

The above samples were submitted to Professor Klein for analysis, and found, in the case of the oysters from Malpas,

to be polluted, and in the case of those from the mouth of the River, to be free from sewage pollution.

The sale of oysters from Mr. Allan's layings at Malpas was accordingly prohibited in the London markets.

On the 12th September, 1903, the Company's Inspector visited Truro and inspected the layings of Mr. J. Gunn in the River Ruan, the layings off Tregothnan Boat House and in the Halwyn River. A sample of Natives was taken at low water from each of the above layings and submitted to Professor Klein for analysis, with the result that the oysters from the River Ruan were distinctly polluted, those from the layings off Tregothnan Boat House were found to be slightly polluted, and the oysters from the Halwyn River were found not to be polluted. See analyses Nos. 141, 142 and 143.

The sale of oysters found to be polluted was accordingly prohibited, but those from the Halwyn River were allowed with a guarantee accompanying each consignment that the oysters were from that river.

A sample of oysters was taken on the 5th January, 1906, from two bags of oysters which had arrived at Billingsgate Market from the Halwyn River layings, Truro, consigned by Mr. J. Gunn. On analysis the oysters were found fairly clean. See analysis No. 250.

The Company's Inspector visited Truro on 27th June, 1907, and took three samples of oysters at dead low water from the foreshore and close to the edge of the water, viz. (No. 327), from just below the layings of Mr. W. H. Gunn, jun., called Lower Bar; (No. 328), from Thom's Rock close by the Ferry; (No. 329), from King Harry's Reach. Sample No. 327 was unclean; neither No. 328 nor No. 329 were clean oysters, though the latter was less unclean than No. 327. See analyses Nos. 327, 328 and 329.

On the 19th July, 1907, two samples of oysters were taken at low water: one from the entrance to Lamouth Creek, and the other from a point immediately inside Lamouth Creek, and submitted to Professer Klein for analysis, who found in regard to both samples "oysters clean." See analyses Nos. 330 and 331.

On the 25th July, 1907, a letter was written to Mr. J. Messer Bennetts, Truro, with reference to the recent indications of pollution, which rendered it necessary for the oysters to be relaid in clean waters, and stating, from a recent inspection, it had been found that Lamouth Creek would be the most suitable place, and, therefore, the Company had decided to advise the Truro oyster planters that they would allow the sale of oysters relaid a sufficient time in Lamouth Creek and requested Mr. J. Messer Bennetts to communicate this decision to them.

On the 16th November the Company's Inspector paid a surprise visit to Truro, and found, from all accounts, the fishermen were scrupulously observing the conditions laid down respecting the relaying of oysters for purifying purposes.

On the 3rd December a copy of the letter addressed to Mr. J. Messer Bennetts was forwarded to the various oyster planters in the Truro layings for their future guidance and information.

See analysis No. 390.

On the 10th December, 1908, a sample of oysters was taken from the shop of Mr. Beszant, No. 2, Monument Street, E.C., from part of a consignment sent to him by Mr. W. H. Gunn, of Hillside, Malpas, Truro, and stated by him to have been gathered from Coombe Creek, near Turnaware Barn. This sample was submitted to Professor Klein, who reported that the oysters were dangerously polluted.

See analysis No. 391.

On the 22nd December, a sample of oysters was taken out of a bag, consigned to Messrs. Baxter & Son, Billingsgate, by J. Gunn, of Coombe Kea. The oysters were guaranteed by J. Gunn to have been relaid in Lamouth Creek. The sample was submitted to Professor Klein, who found upon analysis that the oysters were passable.

In consequence of the result of the analysis of No. 390, the Company's Inspector visited Coombe Kea, Truro, and interviewed several of the oyster fishermen. It was ascertained that the Malpas men had not relaid their oysters as required, either in Lamouth Creek or Gowlands Creek, and that some of the men at Malpas were buying oysters off the dredgermen, taken from the bed of the river, and sending them direct to market, and

this probably accounted for the result of the analysis of sample No. 390. Mr. W. H. Gunn was interviewed and asked to point out the spot where he relaid his oysters in Coombe Creek, which he did, when he stated the oysters had been relaid there three weeks. A sample was taken in his presence, and, whilst they were being packed, one of the fishermen protested by stating that the oysters had only been there two or three days. Gunn, however, adhered to his statement. The fishermen were informed that the fitness of the Creek would not be adjudged by the result of this sample alone.

See analyses Nos. 392 and 393.

Another sample of oysters was taken from the entrance to Lamouth Creek, where they had been for about six months. Both the above samples were submitted to Professor Klein, who found that sample No. 392 was not clean, and that sample No. 393 was questionably clean.

On the 15th January, 1909, Mr. W. H. Gunn was interviewed by the Company's representatives at Truro, in consequence of information having come to their knowledge that the explanation he had given as to the source of the oysters was not true, when he admitted that he had not relaid any oysters in Lamouth Creek earlier than eight or nine days before the visit of the Company's Inspector on 23rd December, which would be after the despatch of the consignment to Mr. Beszant on the 9th December. He also admitted that he had never sent any oysters to the market, which had been previously relaid in Lamouth or Coombe Creeks, although he had received the Company's warning with regard to the sale of oysters from Truro and Fal river districts. He further stated that he had been in the habit of buying oysters from fishermen who had dredged them from all parts of the river. Under these circumstances the Company had no alternative but to institute proceedings against Mr. Gunn, and on the 15th February he was summoned before the Lord Mayor, at the Mansion House Justice Room, for being the person to whom belonged, on 10th December, 1908, certain oysters which were exposed for sale at the shop of Mr. F. H. Beszant, Billingsgate, the same being unwholesome and unfit for the food of man, contrary to the Public Health Act, 1891. The accused

was represented by counsel, instructed by Mr. J. Messer Bennetts, who pleaded guilty on his behalf, and admitted his client had done wrong and would gladly give an undertaking for the future to abide faithfully and loyally by any conditions which the Fishmongers' Company should think fit to impose in the public interest. The Lord Mayor said he considered that he would not be doing his duty to the public if he did not regard this case as one of extreme gravity, and that he should impose a penalty of £50 and £10 10s. costs, or two months' imprisonment in default. The fine and costs were paid.

MUMBLES, SWANSEA.

At Mumbles the oyster layings are situate far out and near the shore in Oystermouth Bay. There are also plantations and perches. The perches are easily accessible at low tide, and are used for the storage of oysters for market purposes.

An inspection was made on 23rd December, 1902. It was found that the plantations were about 300 yards, and the perches about 400 yards, from the sewage outfall.

See analysis No. 3.

In the first instance a sample of oysters from the perches was taken and analysed, and showed limited sewage pollution. Following upon this four further samples were analysed and reported upon as follows, viz.:—

See analyses Nos. 6, 7, 8 and 9.

Beds in the bay (far)... ...	none polluted.
Beds in the bay (nearer shore)	25 per cent. polluted.
Plantations	25 per cent. polluted.
Perches	10 to 15 per cent. polluted.

The sale of Mumbles oysters, with the exception of those certified to have been taken from the beds far out in the bay, was therefore prohibited in the London markets.

The various owners of the oyster perches were Mr. Evans, Mr. Burt, Mr. Gammon, Mr. Lloyd and Mr. Howell.

Dr. Davies, the Medical Officer of Health for Swansea, was of opinion the action of the flood tide carried the sewage away from the oyster beds.

Dr. Lloyd Jones, Medical Officer of Health for Oystermouth, stated that during his term of office—over two years—he had no case of typhoid reported to him.

On October 28th, 1904, the Company's Inspector visited the Mumbles and took a sample of oysters from the "Perches," made up of oysters taken from five different points where they had been relaid for periods varying from seven days to two months, which was submitted to Professor Klein for analysis, who found the oysters were not polluted. See analysis No. 227.

On 23rd November, 1904, a second sample of oysters was forwarded to the Company, stated to have been taken from the perches (similar to No. 227), which was submitted to Professor Klein for analysis, who found they were only very slightly polluted, and passable. See analysis No. 228.

The Company, in consequence of the above two results, and for other reasons within their knowledge, wrote to the clerk of the Oystermouth Urban District Council, Mumbles, on the 8th December, 1904, withdrawing its prohibition of the sale of Mumbles oysters in the London markets, upon the understanding that the Council exercised the same care which had been shewn in the liberation of sewage from the storage tanks. Mr. Robinson, on behalf of the Council, replied there would be no relaxation in the care exercised in the discharge of sewage from their sewer.

MENAI STRAITS.

The oyster layings in the Menai Straits were situated in September, 1903, as follows :—

At Beaumaris, in the Channel between Gallows Point and the Pier, in the occupation of Capt. John Thomas, residing at Beaumaris.

At Gallows Point, in the occupation of Messrs. David Reid & Son, of Liverpool.

At Griffith's Crossing, near Port Dinorwic, in the occupation of Mr. John Lawson, Lime Street, Liverpool.

At Carnarvon (Anglesey side), between the village of Brynsiencyn and Newborough, in the occupation of Messrs. Musson & Co., of Liverpool.

Beaumaris, with a population of 2,300, was found to be discharging its crude sewage at all tides into the Channel, just above the Pier, which would be carried out to sea on the tide running down, and towards Gallows Point when running up.

To the right of Gallows Point and on the other side of the Menai Straits is the Bangor sewage outfall, the discharge from which finds its way into the Channel. The sewage of Bangor, with a population of over 10,000, is not treated. The training ship "Clio" is moored opposite Bangor Pier, with an average of 300 residing on board. The sewage from this vessel is discharged into the Channel. The tides meet at Gallows Point, but it has not been observed that any sewage found its way on to these oyster layings.

At Griffith's Crossing the layings extend for two to three acres on the foreshore, the depth of water being at high tide 17 feet. Carnarvon is three miles, and Portmadoc two miles, distant from these layings. With the exception of two cottages there are no residences near. There are some ponds constructed on the foreshore for the storage of oysters, which are allowed to run dry for a couple of hours daily, and covered at high water.

Opposite Carnarvon the layings are situate on the Anglesey side on the foreshore, and are about three acres in extent. These are covered at high water with about four fathoms. There are no residences, with the exception of one hotel near the Ferry, the sewage from which is discharged into the Straits.

Carnarvon, with a population of about 10,000, discharges its sewage at all times in a crude state into the Channel, and in the opinion of Captain R. Jones, the fishery officer at

Carnarvon, no sewage finds its way across to the Anglesey side on account of the sandbanks.

On 17th September, 1903, samples of oysters were dredged at half tide from the Channel between Gallows Point and Beaumaris Pier, consisting of American oysters which had been relaid in May, 1903, and were not fully grown, and Native oysters which had been in the Channel for some years. Both samples were submitted to Professor Klein for analysis, and with regard to the Americans the question of their pollution or otherwise was a little doubtful, on account of the oysters being so very small, but with respect to the Natives they were were distinctly polluted. The sale of the latter oysters was prohibited. See analyses Nos. 145 and 146.

A sample of American oysters from the layings at Gallows Point was taken at low water, which had been relaid in April, 1903. These oysters were submitted to Professor Klein, and found to be not polluted. See analysis No. 144.

On the 19th September, 1903, a sample of American oysters, relaid in May, 1903, at Griffith's Crossing, and placed in the storage ponds on the 16th September, was taken from the ponds and submitted to Professor Klein for analysis who found that they were polluted. See analysis No. 149.

On the same date a sample of American oysters, relaid in April, 1903, was taken at low water from Messrs. Musson's layings on the Anglesey side of the Menai Straits (opposite Carnarvon), and submitted to Professor Klein for analysis, and there being some doubt in the result a second sample was submitted to Professor Klein on the 16th October, 1903, who reported that, provided the external circumstances concerning the locality of the layings were not objectionable, the samples submitted might be passed. See analysis No. 150. See analysis No. 160.

The owner of the layings between Gallows Point and Beaumaris Pier decided to remove the oysters to another and more suitable place in the Menai Straits.

CONWAY.

On the 27th December, 1907, the Company's Inspector visited and inspected the Conway Mussel Fishery, the beds being situate in the estuary of the Conway River. It was found that the crude sewage of a normal population of about 5,000 flowed into the river by means of seven sewer outfalls located at various points, extending from Deganwy to immediately above the bridge, which were discharging continuously at all states of the tide, and as the beds were in proximity to the sewer outfalls, any mussels taken from these beds must be attended with grave risks to the public health. The Company, therefore, considered it very desirable that samples of mussels and water should be taken, and accordingly on Saturday, the 25th January, 1908, a sample of water was taken at low water from the surface in the middle of the river, opposite Deganwy Point, and put into a sterilized bottle supplied by Professor Klein. Four samples of mussels were also taken, viz., one (marked A) from a mussel bed running from above to below the bridge at Conway, half of the mussels constituting the sample being taken about 50 yards above the bridge, and the remainder about 50 yards below the bridge, from an average depth at low water of 30 feet. In the vicinity of this bed there were two sewer outfalls. The second sample (marked B) was taken from a sandbank (exposed at low water) opposite Deganwy. The third sample (marked C) was taken from a mussel bed in the channel of the river, some 300 yards below the Deganwy outfall, and at a depth of 20 feet at low water; and the fourth sample (marked D) was made up of mussels taken at the entrance to the Western Channel, the remainder being taken some 500 yards higher up the channel. The before-mentioned samples were submitted to Professor Klein for analysis, who found in the result that the water was quite passable as surface water; and with regard to the four samples of mussels, that those marked A and D were decidedly unclean. The sample marked B was not clean but better than A and D, and that the sample marked C was not clean but better than sample marked B.

See analyses Nos. 358, 359 360, 361, 362.

On the 3rd June, 1908, the Company's Inspector again visited Conway, and in company with Mr. Johnstone, of the Fisheries Laboratory, Liverpool, and Capt. Jones, of the Lancashire and Western Sea Fisheries, samples of mussels, mud and water were taken, viz., the mussels and mud from the shore near Penmaenbach, well up the beach under Morfa Range, No. 6 Red Buoy being in line with Gt. Orme's Head, the water being taken from a pool at the above place. These three samples were submitted to Professor Klein, who found the mussels were unclean, the mud distinctly unclean, but the water quite passable. See analyses Nos. 369, 370 and 371.

On the 21st August, 1908, the Company received from Capt. Jones a further sample of mussels which he had taken on the previous day (20th) from the same place as sample No. 369, which was submitted to Professor Klein, who found that the mussels were passable. See analysis No. 379.

On the 20th October, 1908, a further sample of mussels was taken at low water from the same place as samples 369 and 379, where they were bred and born, and submitted to Professor Klein, who found that the mussels might be considered to be passable. See analysis No. 382.

From these analyses the Company consulted Professor Klein, who gave his approval to the scheme of relaying mussels on the beach under Morfa Range, near Penmaenbach, Conway.

On the 14th December, 1908, the Company's Inspector again visited Conway, and conferred with Mr. Delamotte, the Corporation Surveyor, when he was informed that although the fishermen had agreed to meet and deliberate the question of relaying their mussels, they had failed to carry out their part; and Mr. Delamotte accompanied the Company's Inspector to the place proposed to relay their mussels, viz., the foreshore at Penarth, which was found to be physically adapted, it occupied a sheltered position accessible to the town; but against this there were two important sewer outfalls not so distantly removed therefrom, and the probability of the river giving rise to eddies owing to its configuration at this spot; and it was

arranged to have some mussels relaid there, and after the end of a week to forward a sample for analysis.

Up to the date of going to press no sample of mussels has been received for analysis.

FLEETWOOD.

The Arm Hill oyster layings in the River Wyre, Fleetwood, are situate on the eastern foreshore of the river, and some distance from the town, and are in the occupation of Sir Charles Petrie, of Liverpool.

See analyses Nos. 187 and 188.

On the 15th December, 1903, a sample of American oysters (relaid in April, 1903), and a sample of mussels were taken at low water, and afterwards submitted on the following day to Professor Klein for analysis, who found traces of pollution in both samples.

From the position of these layings, the shell fish should be little exposed to pollution. The Corporation of Fleetwood are now constructing a new sewage outfall to discharge at Nossall Point into the Irish Sea, which will, when completed, remove any danger of pollution.

SCOTLAND.

DUNURE.

See analysis No. 335.

On 17th August, 1907, some winkles were taken out of two boxes consigned from Dunure to Messrs. Brice Bros. at Billingsgate Market. The consignors had gathered the winkles seven miles from Girvan, and at a distance of 1½ miles from any human habitation. In accordance with what was stated to be the usual practice, the winkles were stored before despatch in the water at Dunure by the Harbour. Professor Klein found upon analysis that the winkles were decidedly unclean.

The senders were instructed to discontinue their practice of storing the winkles, and requested to despatch them direct to market from the fishing grounds.

LOCHRYAN, STRANRAER.

The Lochryan Oyster Fishery Company, Limited, forwarded, on the 25th October, 1906, for analysis, a sample of oysters which they had purchased from Falmouth, and relaid in Lochryan for a month. Professor Klein reported the oysters were not clean. See analysis No. 309.

The Lochryan Oyster Fishery Company, Limited, forwarded on the 11th January, 1907, a further sample of Falmouth Natives which they had relaid at Stranraer on their grounds in September last, and was submitted to Professor Klein, who reported "oysters unclean." See analysis No. 320.

The Company's Inspector proceeded to Stranraer on the 24th January, 1907, and inspected the oyster beds of Lochryan, which have been in existence since 1901, and held under a Charter granted 200 years ago to the Lochryan Oyster Fishery Company, Limited. Oysters are to be found over the whole of the loch, but the area, about five square miles, devoted to the cultivation and preparation of oysters for market, is that contained inside the "Scaur," *i.e.* southward and westward of the loch. Several millions of oysters are relaid on these beds, comprising "Whitstables," "French," "Cornish" and "Lochryan's." Lochryan is reputed as being the best oyster fishery in Scotland.

Stranraer has a population of over 6,000, and nearly all the houses are connected with the sewers, which discharge westward of East Pier. The sewage being discharged down the west side of the loch continuously, taking into consideration the slackness of the tide between the "Scaur" and Stranraer on the western side of the loch, there is a probability that the oyster beds in question are exposed to pollution.

The Company's Inspector arranged with Mr. Scotland, the Manager, with a view of testing suitable grounds for samples of oysters to be relaid at given points, and after a month for the samples to be taken up and forwarded to the Company for analysis.

See analyses Nos. 322, 323 and 324.

On 27th February, 1907, the Company forwarded from Stranraer three samples of oysters, viz. samples Nos. 322 and 323 "Falmouth Natives," and No. 324 "Whitstable Natives," all of which had been relaid on points suggested by the Company's Inspector, which on analysis were found to be —No. 322, decidedly unclean; No. 323, slightly unclean; No. 324, not clean.

See analysis No. 325.

A further sample of Falmouth Natives relaid at Stranraer, a little way north of the Scaur Buoy, and in the deep water, was taken at half ebb from the Lochryan Oyster Fishery Company, Limited, and submitted to Professor Klein on the 3rd April for analysis, who reported "oysters not clean."

See analysis No. 326.

A further sample of oysters, relaid Natives, taken at low water from Lochryan Bay, north of the Cairn Point, was forwarded by the Lochryan Oyster Fishery Company, and submitted to Professor Klein on the 12th April, who reported result, "oysters clean."

Lochryan was again visited on the 9th May, 1907. Mr. Wallace and Mr. Scotland pointed out the place where it was proposed to construct pits, where oysters might be relaid preparatory to being sent to market. It is situate on the east side of the loch, at a distance of about six miles from Stranraer, and known by the name of Gravelly Point. The pits when constructed will be charged daily with water direct from the Irish Sea. Sample No. 326 was taken at a point some quarter of a mile nearer Stranraer than where the pits are constructed.

See analysis No. 347.

The Lochryan Oyster Fishery Company, Limited, sent some mussels, on the 13th October, taken from the deep water at Lochryan, below Gravelly Point, and believed to have come from the Scaur, where there are large beds of them, and submitted to Professor Klein for analysis, who found that only a small number were suited for analysis, and in the result that they might be considered fairly passable.

On the 22nd July, 1908, the Company's Inspector visited and inspected the new tanks (three in number) of the Lochryan

Oyster Fishery Company, situate on the eastern side of Lochryan, at Gravelly Point, each of the tanks measuring 40 ft. by 50 ft., with a depth of 6 ft. 6 in. The tanks are constructed of cement, gravel and sand, with their exposed surfaces thickly coated with cement; the floor of each tank having a fall of three inches to the corner where the valve for regulating the filling and emptying the tanks is placed. The water is brought to the tanks by means of an iron pipe 180 ft. in length, with a diameter of 24 in. This pipe runs in an oblique direction to the beach, and northward. From this main pipe the tanks are supplied with branch pipes, each having a diameter of 12 in., and each pipe, at its mouth, being fitted with a valve of the most approved kind. The main pipe is taken down the beach only as far as it will permit water to flow into the tanks after the tide has been running nearly three hours, when the filling continues to high water. An average depth of water of four feet is attained in the tanks. The oysters to be laid in the tanks will be placed on trays about 4 ft. by 3 ft. 6 in. deep, with perforated bottoms. These trays will be laid on moveable concrete blocks 2 in. thick.

From a sanitary point of view the tanks are ideally situated, and it may be said that they are in the open sea, seeing that, as already stated, the inlet pipe has been so fixed that the tide flows up the loch for nearly three hours before water has access to the tanks, that the said tanks are located at a place less than three miles from the sea, and the tide runs up to Gravelly Point and beyond at considerable velocity; it will be obvious that the water entering the tanks is water direct from the open sea.

A sample of oysters, comprising Whitstable, Cornish, French and Lochryan Natives respectively, was taken out of one of the new tanks, where they had been placed for three weeks, previous to which they had been dredged from the beds at Lochryan, and submitted to Professor Klein for analysis, who found that the oysters were satisfactory.

See analysis No. 374.

IRELAND.

ARDFRY, Co. GALWAY.

See analysis No. 396.

On the 4th January, 1909, a sample of "Red Bank" oysters was taken from Mr. D. J. Mooney's layings at Ardfry, Co. Galway, and sent to the Company on the instructions of Mr. E. W. L. Holt, of the Department of Agriculture and Technical Instruction (Fisheries Branch), Ireland (the Department having an experimental oyster station at Ardfry), for analysis. Samples of oysters, mud and water from the same place having been examined by Dr. McWeeney, before the experimental station was established, the sample was accordingly submitted to Professor Klein, who found that the oysters were clean, and quite free of all deleterious microbes.

CARLINGFORD.

On the 26th October, 1903, a sample of mussels was received from Messrs. Musson & Co., of Liverpool, which were stated to have been taken from their layings at Carlingford.

See analysis No. 166.

This sample was submitted to Professor Klein for analysis, who reported that two out of eight contained b. coli communis in numbers; two had some other kind of b. coli; of four specially examined, none had streptococci.

On Wednesday, 1st November, 1905, the Company's Inspector visited Warren Point, and took a sample of Native oysters from the public grounds on the edge of the western side of the Channel (*i.e.* the side of the Channel farthest from Warren Point), at a point almost opposite Warren Point Quay, at top spring tide.

Newry (with a population of about 13,000), situate about six miles from these layings, discharges its crude sewage into the river.

Warren Point, the normal population of which is about 2,000, also discharges its crude sewage into the river.

The above sample of oysters was submitted to Professor Klein for analysis, who reported that of eight oysters one contained b. coli communis in numbers; of four specially examined one contained streptococci of some kind; of two specially examined none contained spores of b. enteritidis sporogenes, and that from the above analysis it followed that these oysters could not be considered to be polluted; if local conditions were favourable they could be passed. See analysis No. 242.

QUEENSTOWN.

On the 2nd February, 1908, the Company's Inspector took a sample of oysters from Messrs. Baxter & Son's premises at Billingsgate Market, from a consignment of oysters received by them from the Fota Island Oyster Fishery at Queenstown, which were submitted for analysis to Professor Klein, who reported that the oysters were not clean. See analysis No. 365.

FRANCE.

CANCALE.

On the 28th March, 1908, the Company's Inspector took a sample of oysters from a consignment exposed for sale at the shop of Messrs. H. Saunion, in Lower Thames Street, which had been received from Cancale (Ile Villaine). This sample was submitted to Professor Klein for analysis, who reported that these oysters could not be considered to be clean and were not satisfactory. See analysis No. 366.

PORTUGUESE OYSTERS FROM FRENCH LAYINGS.

See analysis No. 65.

On the 16th February, 1903, a sample of Portuguese oysters received direct from the beds of Mlle. A. Menanger, La Flotte, at Ile de Ré, France, by Messrs. Baxter & Son, at Billingsgate Market, was submitted to Professor Klein for analysis, who reported that they were not polluted.

See analysis No. 66.

A further sample received direct from the beds of the above-named firm at Arcachon, France, was also submitted to Professor Klein, who reported that they were polluted.

See analysis No. 78.

On the 19th February, 1903, a further sample of oysters received direct from the beds in the open bay at Ile de Ré (Mlle. Menanger), by Messrs. Baxter & Son, was submitted to Professor Klein for analysis, who reported one in ten had b. coli communis.

See analysis No. 79.

On the same date a sample of Portuguese oysters received direct from Château d'Oleron, Charente-Inférieure (A. Menard), by Messrs. Baxter & Son, was submitted to Professor Klein for analysis, who found that one in ten contained b. coli communis.

See analysis No. 81.

On the 20th February, 1903, a sample of Portuguese oysters received direct from the beds in the open sea, Nieul-sur-Mer, Charente-Inférieure, sent by Premier-Crignon & Cie., per Messrs. Baxter & Son, was submitted to Professor Klein for analysis, who found they were not polluted, but clean.

HOLLAND.

See analysis No. 63.

On the 11th February, 1903, a sample of Dutch Natives, received direct from Holland by Messrs. Baxter & Son, at Billingsgate Market, was submitted to Professor Klein for analysis, who found they were not polluted, and reported that they were very clean.

On 14th October, 1903, the Company's Inspector took a sample from a bag of Dutch mussels which had arrived direct

from Bruinisse, consigned for sale to Messrs. Baxter & Son, Billingsgate Market.

The sample (twelve in number) was submitted to Professor Klein for analysis, when ten were found to have b. coli communis in numbers; one further mussel had some other kind of b. coli; of six mussels specially examined two had streptococci; and of four mussels specially examined one had the spores of b. enteritidis sporogenes. See analysis No. 154.

On 23rd, October, 1903, a sample of mussels cooked by steam for six minutes, at Billingsgate Market, was submitted to Professor Klein for analysis, and was found not to be polluted. See analysis No. 163.

In the month of January, 1904, one of the Company's Inspectors proceeded to Holland to inspect the oyster and mussel layings, and to take samples for the purpose of analysis by Professor Klein.

It was ascertained that very large quantities of oysters and mussels were exported to the London and Provincial markets.

The oyster and mussel layings are situate beyond the low water line and are the property of the State. They are rented in "Parcels," and are allocated to private individuals or companies, and consequently the State is able to exercise control over the layings. The spaces lying between the low water and high water marks (the foreshore) are the properties of the respective Lords of the Manor. The State issues certificates to proprietors of oyster pits and mussel ponds if it consider such places are not exposed to pollution.

On the 4th January, 1904, samples of oysters and mussels were taken from the De Hals Layings. From a general inspection of these layings no trace of any contamination by sewage could be seen. A sample of oysters marked "A^H" was taken from "Parcel" No. 48 when the tide was well on the flood. A sample of mussels marked "B^H" was also taken from "Parcel" No. 68. These were submitted to Professor Klein for analysis, who found that both the oysters and mussels were quite clean. See analyses Nos. 195 A^H and 196 B^H.

On the 5th January, 1904, Ijerseke, Bergen-op-Zoom and Tholen were visited. At Ijerseke there are a large number of oyster pits, some being situate on the foreshore and mostly inland. The inland pits are enclosed by dykes.

See analysis No. 197 C$^{H.}$

A sample of oysters marked "C^{H}" was taken from a pit about a mile from Ijerseke, which had been placed there for several months. It was submitted to Professor Klein for analysis, who reported that the oysters were quite clean.

See analysis No. 198 D$^{H.}$

A sample of oysters marked "D^{H}" was also taken between Ijerseke and Bergen-op-Zoom, from some layings which appeared to be far removed from any actual contamination by sewage. This sample was also submitted to Professor Klein for analysis, who found that out of eight oysters one contained some acid and gas-forming microbe, but not b. coli, and all the other oysters were clean.

At Bergen-op-Zoom there are a number of oyster pits. It was ascertained that one of these pits had not had a certificate granted by the State, another had been voluntarily abandoned by its owner, and another had been unconditionally condemned.

At Tholen there are a number of oyster pits situate on either side of the river.

On the 10th January, 1904, Bruinisse was visited, where there are a number of oyster pits and mussel beds belonging to Mr. de Waal and others. A sample of mussels was taken from the beds marked "E^{H}" situate furthest from the entrance to the harbour. A sample of oysters which had been relaid for about 14 days, was also taken marked "F^{H}," from one of the pits situate on the other side to the entrance to the harbour.

See analyses Nos. 202 E^{H} and 203 F$^{H.}$

From an inspection of the general surroundings the village of Bruinisse is numerously intersected with watercourses, which discharge themselves into a canal and ultimately into the harbour. The harbour is about 310 yards long and 100 yards wide. The mussel beds and oyster pits are situate just outside the harbour, and at low water the waters flowing from the canal reach the mussel layings. The sample of mussels was submitted to Professor Klein, who found that out of ten one had

b. coli communis in small numbers, and four had some other kind of b. coli; of six specially examined three had streptococci; of four mussels two had spores of b. enteritidis.

The sample of oysters was also submitted to Professor Klein for analysis, who found that out of ten oysters one had b. coli communis in small numbers; of six specially examined one had streptococci, none having spores of anaerobe.

It was noticed that, for several hours daily, liquid sewage passed on to the foreshore, and no doubt this would account for the pollution of the mussels and oysters before referred to.

On 29th October, 1906, a sample was taken from a small barrel of oysters on the premises of Messrs. Brice Bros., in Botolph Alley, which they had received from Ijerseke, Holland, also a sample of oysters from a small barrel on the premises of Messrs. Baxter & Son, at Billingsgate Market, which they had received from Bruinisse, Holland. These two samples were handed to Professor Klein for analysis, who found that neither sample was markedly unclean. See analyses Nos. 311 and 312.

On 4th September, 1907, a sample was taken from a bag of mussels in the possession of Messrs. Baxter & Son, Billingsgate Market, which had arrived from Bruinisse, Holland, the previous day. This sample was submitted to Professor Klein, who reported that on analysis the mussels were passably clean. See analysis No. 336.

On 20th September, 1907, a sample of mussels was taken from a consignment to Mr. G. Allison at Billingsgate Market, which he had received from S. Zealander & Co., of Terschelling, North Holland. Professor Klein reported he found the mussels passable. See analysis No. 343.

A sample of oysters was taken on 4th October, 1907, from the premises of Messrs. Baxter & Son, Billingsgate Market, out of a barrel marked "Z" from Bruinisse, Holland, which was submitted to Professor Klein for analysis, who found in the result the oysters were not clean. See analysis No. 345.

A sample of oysters was taken on 26th November, 1907, from Messrs. Baxter & Son's shop in Billingsgate Market, which had just arrived from Bruinisse, Holland, in a barrel. The See analysis No. 354.

Dutch Government guarantee the purity of the oysters taken out of the pits at Bruinisse, the pits having recently undergone structural alterations. Professor Klein reported he found on analysis the oysters fairly clean and quite passable.

See analysis No. 367.

On the 7th April, 1908, the Company's Inspector purchased a sample of North Dutch oysters at the shop of Mr. T. M. Wright, in Billingsgate Market, which he stated had been received by him from North Holland, and which was afterwards submitted for analysis to Professor Klein, who found that the oysters were not clean.

See analysis No. 386.

On 18th November, 1908, the Company's Inspector took a sample of oysters out of an unopened barrel (marked "B^A") which had been received by Messrs. Baxter & Son, in Billingsgate Market, on the 16th November, 1908, from Mr. J. J. Willemsen, jun., Viestraat, Ijerseke, being the same class of oyster and from the same sender as those supplied to the Cator Lodge banquet, held on 21st October at the Beckenham Town Hall.

This sample was submitted to Professor Klein, who found that the oysters were clean.

SOUTH HOLLAND.

See analyses Nos. 408 and 409.

On 16th March, 1909, two samples of oysters were taken at the "Trocadero." No. 408 was taken out of a barrel which had arrived at the restaurant that day. No. 409 was taken, having been in salt and water for a brief period, after its arrival at the restaurant. The Company's Inspector was informed that the oysters in question had been supplied by the Whitstable Oyster Company, who had received them from the South of Holland; they were accompanied by a Government Certificate attesting their derivation from a pure source. Both samples were submitted to Professor Klein, who reported in the result: No. 408, oysters passably clean; No. 409, oysters doubtfully clean.

On the 25th March, 1909, a sample of oysters was taken by the Company's Inspector at the shop of the Whitstable Oyster Company, Fish Street Hill, E.C., out of a barrel marked "Large W. O. F., Vlissingen," and stated to have been taken from the same place as samples Nos. 408 and 409. Professor Klein found upon analysis that the oysters were passable. See analysis No. 412.

On Saturday 17th April, 1909, a visit and inspection was made by the Company's representatives to Wemeldinge, a village of some 2,000 inhabitants. It was stated that neither directly or indirectly does there pass from thence to the River Scheldt the contents of any sewers or privies, &c. Mr. Lindenberg and Mr. B. H. Overman, of Tholen, escorted the party to view the oyster pits, which are situate inside the dyke at Wemeldinge. From a structural and sanitary point of view the pits appeared to be everything that could be desired. As evidence of the care that had been taken in their construction, it may be noted that, in order to avoid washings, &c., from the banks getting into the pits, there is a channel made all round the pits for the reception of such tricklings, and by this isolation of the pits nothing can possibly get into them but sea water. Respecting the admission of water into the pits, the intake is so placed that the tide flows for nearly three hours before there is an inflow, and there is a great depth of water in the immediate neighbourhood of the intake. The filling and emptying of the pits is governed by a penstock which is fixed in a hut on the slope of the dyke.

The packing-house is in close proximity to the pits; the house was in a clean condition, and well adapted for culling the oysters and packing. The oysters are packed in new barrels, holding from 250 to 300 each, when they are carted to the railway station, and thence transferred to covered railway waggons.

At Flushing Station the conditions under which the oysters arrive for the boat, and the manner of their handling and storing on the boat, and their subsequent treatment on arrival in London, showed that they were manipulated in a manner leaving nothing to be desired, and that they were protected from all danger of being polluted in transit.

UNITED STATES of AMERICA.

In consequence of the Medical Officer of Health for the City of London having submitted two samples of American oysters (Blue Points) procured from Mr. Geo. Tabor, Billingsgate Market, to Professor Klein for analysis, who had reported that they showed very serious pollution and typhoid bacillus, the Company's Inspector on the 15th December, 1903, took a sample of American oysters from one of the barrels consigned direct by Mr. G. Vanderborgh, Oyster Merchant, of West Sayville, Long Island, to Mr. Geo. Tabor, Monument Street, E.C., which was submitted to Professor Klein for analysis, who reported that ten out of twelve oysters examined had b. coli communis in numbers, and that they were polluted with sewage to a large extent, and were in his opinion unsafe for consumption.

See analysis No. 186.

Investigations were made with reference to the transit of oysters from America, and it was found upon enquiry that the conditions under which they were shipped were of such a character that left no doubt they were brought over under proper sanitary conditions.

The attention of the United States Consul was called to the matter, and he was asked to have enquiries made to ascertain the possibility of contamination of the American beds from sewage, if the oysters were clean when dredged, the mode of handling the oysters after being dredged, the means of transit from Long Island to New York, and the way in which the oysters were stowed on board ship for England; in due course the State Department at Washington communicated with the Secretary of the Department of Commerce and Labour, and in the result, during the latter part of February, 1904, a representative of the Bureau of Fisheries visited the oyster grounds which largely supply the English trade. Samples were examined directly from the beds, freshly taken, and from sources where the presumption of contamination, if any, was greatest.

Bacteriological tests for sewage pollution were made independently by two bacteriologists, and the results agreed in failing to find any indication of sewage contamination.

It appears that after the oysters are dredged they are usually placed in "floats" close to the shore, in salt water, for the convenience of the dealer. For export they are then barrelled and shipped by rail to New York, where the barrels are packed in the holds of ocean steamers, and from the time the oysters leave the grounds until they arrive in England, there seems to be no possible means of contamination. The practice of floating, however, during which the oysters lie in the shallow shore water for two or three days, does open the way to some extent for the entrance of pathogenic bacteria, should such happen to be in the water.

This is the only practice in the handling of the oysters that is open to objection. But, whatever its possibilities, the American authorities state it can hardly have caused serious disease, for the local population on the oyster grounds consume largely the raw oyster, and are free from typhoid or enteric epidemics, and suffer in only sporadic cases. It is apparent, however, that even where sewage is absent from the vicinity of oyster grounds, or where sewage disposal is properly effected, there is some slight risk of occasional contamination of the oysters in floats, and it seems probable that the American oysters examined in England received their pollution while in such floats, and from some unusual and irregular source.

The layings at West Sayville were inspected and samples taken; these were placed in the floats near the shore, and tested like the others after a few days. All were undoubtedly free from sewage. The vicinity of the floats and the shore line were inspected, and were quite free from sewage systems. The village is small, has no municipal sewerage, and is located well back from the bay.

On the general question of the exposure to possible sewage contamination of the beds from which exported oysters are taken, it is to be said that with very few exceptions no sewers enter their vicinity.

Oysters from the beds at Great South Bay were tested, and were found to be free from sewage.

In furtherance of a high standard of protection for the beds, the Department is doing what it can to bring about a discontinuance of the practice of keeping oysters in floats, and thus remove the only possible source of contamination to which the few cases cited can be approximately traced.

See analysis No. 387.

On 1st December, 1908, the Company's Inspector was informed by Mr. T. M. Wright, in Billingsgate Market, that he had received a consignment of American oysters (Blue Points) from New York. A sample of the oysters was taken from a barrel marked "T. M. W., London," and submitted to Professor Klein for analysis, who found that the oysters were clean.

Bacterioscopic Examinations of Shell Fish by Prof. KLEIN, M.D., F.R.S.

SUMMARY OF REPORTS.

1	Emsworth ...	Oysters and water	Practically water and oysters alike both contaminated with sewage.
2a	Leigh Creek...	Cockles, rolaid	Marked evidence of sewage contamination.
2b	Blyth beds ...	Cockles	Sewage pollution extensive.
3	Mumbles ...	Oysters	Sewage pollution limited.
4	Maplin Sands	Cockles	Sewage pollution.
5a	Bosham ...	Oysters	Sewage pollution extensive.
5b	Do. ...	Oysters (further sample)...	40 per cent. polluted.
6	Mumbles ...	Oysters. Beds in Bay (far)	None polluted.
7	Do. ...	Oysters. Beds in Bay (nearer shore)... ...	25 per cent. polluted.
8	Do. ...	Oysters. Plantations	25 per cent. polluted.
9	Do. ...	Oysters. Perches	10 to 15 per cent. polluted.
10	Whitstable Oyster Co.	Imperials from grounds	None polluted.
11	Do.	Natives from slank	None polluted.
12	Do. ...	Large natives from inside slank	None polluted.
13	Southwick ...	Oysters. Pit	40 per cent. polluted.
14	Do. ...	Oysters. Beds	25 per cent. polluted.
15	Whitstable Oyster Co.	Sample of water from pits	Polluted.
16	Do. ...	Sample of water from beds	Not polluted.
17	Seasalter and Ham Oyster Co.	Whitstable natives from Ham layings... ...	None polluted.
18	Do. ...	Whitstable natives from Pollard layings ...	None polluted.

19	Seasalter and Ham Oyster Co.	Princess oysters from Pollard layings	None polluted.
20	Do. ...	Sample water from Ham layings	Polluted.
21	Do. ...	Sample water from Ham pits	Polluted.
22	Maplin Sands	Cockles boiled 3½ minutes	No b. coli communis or spores enteritidis sporogenes.
23	Do.	Cockles boiled one minute	One cockle "something" like b. coli communis, all others free of it. Half cockles examined, no spores b. enteritidis alive.
24	Leigh Creek...	Cockles relaid, boiled one minute	Strongly polluted.
25	Do.	Cockles relaid, boiled 3½ minutes	Negative.
26	Maplin Sands	Cockles put in boiling water, taken out as water boiled over. Time in wator 3½ minutes.	Negative.
27	Leigh Creek	Cockles relaid (boiled same as No. 26, time 3¾ minutes)	Negative.
28	Do.	Cockles relaid (in shell)	Strongly polluted.
29	Blyth Sands	Cockles (boiled same as No. 26, time 3¼ minutes)	Slightly polluted.
30	Jenkin, opposite Islo of Grain (continuation of BlythSands)	Cockles (boiled same as No. 29)	Negative (?).
31	Whitstable Oyster Co.	Water, pit	Polluted.
32	Do.	Oysters, pit	One out of ten had coli-like bacilli, but no b. coli communis.
33	Seasalter and Ham Oyster Co.	Water, pit	Polluted.
34	Do.	Oysters, Princesses, Pollard layings	One out of ten has b. coli communis and b. enteritidis sporogenes.
35	Faversham, East Kent Co.	Oysters, layings	One out of ten oysters contained a coli-like microbe but no b. coli communis.
36	Hadleigh Ray	Mussels, layings	Over 50 per cent. polluted.
37	Do.	Spanish oysters, layings	One out of ten polluted (?).

38	Hadleigh Ray	American oysters, layings	Not polluted.
39	Falmouth, nr. Flushing	Oysters, layings	Extensive pollution.
40	Wivenhoe	Natives—Shed in pit ground	Not polluted.
41	Do.	Portuguesc, from water at entrance to pit ...	Strongly polluted.
42	Do. ...	Oysters from Fingringhoe pit	Not polluted.
43	Brightlingsea Creek	Natives, layings	Do.
44	Do.	Portugucse, layings close by Hard	Polluted to extent of about 25 per cent.
45	Medway ... Rainham Grounds, Bartlett Creek	Natives, layings	Not polluted.
46	Do.	Portuguese, layings	Polluted 30 per cent.
47	Do. Captain's Creek and Medway Saltings	Natives, layings	Not polluted.
48	Do.	Portugucse, layings	Polluted 25 per cent.
49	Do. Sharfleet Creek	Natives, reservoir	Slightly polluted.
50	Do.	Water, reservoir	Polluted.
51	Do.	Natives, layings	Slightly polluted.
52	Do. Coalmouth Creek	Do. tank	Not polluted.
53	Do.	Do. pit	Do.
54	Do.	Portuguese, layings	Polluted about 30 per cent.
55	Do.	American, do.	Not polluted.
56	Do. Pinup Reach	French, do.	Do.
57	Do.	Natives, do.	Do.
58	Hadleigh Ray	Americans, do.	Do.
,,	Do.	Portuguese, do.	Slightly polluted.
,,	Do.	Natives, do.	Not polluted.
59	Do.	Mussels, do.	Polluted.
60	Brightlingsea, Long Reach, near Queenboro'	Natives, do.	Slightly polluted.
61	St. Osyth Channel	Americans, do.	Not polluted.

62	Stangate Creek	Oysters, layings	Not polluted.
63	Holland ...	Dutch Natives	Not polluted, very clean.
64	Medway, Hamooze bed adjoining Captain's Creek	British-born Portuguese	Not polluted.
65	Ile de Ré, France	Portuguese beds	Do.
66	Arcachon, France	Portuguese...	Polluted.
67	Medway, Sharfleet Creek	Do.	One of ten oysters contained b. coli communis and b. enteritidis sporogenes.
68	Stangate Creek	Do.	Do.
69	Long Reach, near Queenboro'	Do.	Do.
70	Mersea Fleet, Strood Channel	Natives, Cobmarsh pit	Free of any pollution and remarkably clean.
71	Do. ...	Brittany, oysters south ond of Fleet layings ...	Do.
72	Do. ...	Portuguese, layings south end of Fleet layings	Do.
73	Do. ...	Natives, south end of Fleet layings	Do.
74	Do. ...	Portuguese mid-channel north layings... ...	Do.
75	Do. ...	Brittany pit, near north laying	Do.
76	Do. ...	Natives, home pits	Do.
77	Do. ...	Natives, north layings	Do.
78	Ile de Ré, France	Portuguese, beds in open bay	One oyster out of ten has b. coli communis.
79	Château d'Oleron Charante Inférieure	Portuguese beds	Do.
80	Brightlingsea Creek	Portuguese, layings originally from Ile de Ré	Not polluted, clean.
81	Nieul-sur-Mer Charente Inférieure	Portuguese...	Do.
82		(Cockles not analysed)	
83	Ningwood Creek, Newtown, I. of W.	Oysters, layings	Not polluted, very clean.

84	Wootton Bridge, Fishbourne, I. of W.	Oysters, pit (see further sample 90)	One out of ten oysters has coli-like microbe closely related to b. coli communis but not quite identical. One out of ten oysters has sporos of b. enteritidis sporogenes.
85	WoottonCreek	Oysters, pit...	One out of eight has b. coli communis.
86	Maplin Sands	Cockles cooked in the usual way	No b. coli in any (16 examined).
87	Pyefleet Creek	Natives, layings	Not polluted.
88	Do. ...	Water, layings (about centre)	Do.
89	Fishbourne Creek	Natives, layings	Polluted 25 per cent.
90	Wootton Bridge	Oysters, pit (further sample to No. 84) ...	Do.
91	Poole Harbour	French relaid oysters, pit	One out of eight contains b. coli communis and spores of b. enteritidis sporogenes.
92	Do.	Native and American, pits (further sample see 93 and 94)	None contains b. coli communis.
93	Do.	Natives, pits	Do.
94	Do.	Americans, pits	Do.
95	... ...	Flushing oysters from layings whence sample (No. 39) taken and analysis proved "extensive pollution."	
		Relaid at Stangate Creek one week	One of eight contains b. coli communis.
96	River Swale... Fowley Channel	Natives and French, layings	Polluted; the French oysters markedly, the Natives slightly.
97	Do.	Portuguese, layings	Polluted about 30 per cent.
98	Flushing, Port of Falmouth, relaid at Stangate Creek for 20 days	Nativos, layings (further sample)	None of these oysters contains either b. coli communis or b. enteritidis sporogenes.
99	River Yealm, Yealmpton	Natives, layings	No b. coli of any kind in any oyster.
100	Do. ...	Water, layings	No b. coli and no b. enteritidis sporogenes.

101	Bosham	...	Natives, Eleanor layings, southern extremity. (This is considered to be approximately the position whence sample No. 5B was taken.)	Of nine oysters, two yielded b. coli communis; four yielded coli-like microbes. Neither of two oysters examined yielded b. enteritidis sporogenes.
102	Do.	...	Water do.	Not polluted.
103	Do.	...	Natives taken from north end of the Rudder Rock layings	Of nine oysters, one yielded b. coli communis; two others yielded coli-like microbes. Neither of two oysters examined yielded the spores of b. enteritidis sporogenes.
104	Do.	...	Water do.	Not polluted.
105	Do.	...	Solent Natives from the Bosham Deep northern extremity of the layings.	Of nine oysters, none yielded b. coli communis or microbes which could be grouped amongst the b. coli tribe. Neither of two oysters examined contained the spores of b. enteritidis sporogenes.
106	Do.	...	Water do.	Not polluted.
107	Mersea	...	Portuguese oysters taken from the upper portion of North layings, W. Mersea.	One in eight has b. coli communis.
108	Do.	...	Water do.	No b. coli communis.
109	Do.	...	Portuguese oysters (eight only) taken from the Southern and Mersea Fleet layings.	None has b. coli communis.
110	Do.	...	Natives from Southern end Mersea Fleet layings	Do.
111	Do.	...	Natives from middle of Salcot Creek ...	Do.
112	Do.	...	Natives taken from two points of the layings (called Deep and South shore respectively).	Do.
113	Do.	...	Natives from about the middle of "Ditch layings."	Do.
114	Do.	...	Natives taken from Tollesbury layings, South Channel, Woodrope Creek end.	One in eight has b. coli communis.
115	Do.	.	Natives taken from about middle of North Channel	None has b. coli communis.
116	Do,	..	Water taken at extreme end of layings in South Channel, and close to entrance of Woodrope Creek.	No b. coli communis

117	Penryn River, Cornwall	Cornish oysters taken from layings where they had been for abont a year.	One in eight has b. coli, but not b. coli communis.
118	Do.	Do. do.	Two in eight have b. coli communis; one further oyster has b. coli of other kind, and spores of b. onteritidis sporogencs.
119	Do. (Green Bank, Pier end)	Water	No b. coli communis.
120	St. Mawes, Porthcuel River	Cornish oysters from layings. ...	One in eight has b. coli communis.
121	Malpas ...	Do. do.	One in eight has b. coli commnnis; two other oysters have b. coli of other kind.
122	River Fal ...	Cornish oysters from layings close to mouth of River Fal.	No b. coli of any kind.
123	Leigh ...	Cockles, cooked in the usual way for market, believed to have been relaid in the Leigh Creek.	One of eight contained b. coli commnnis.
124	Do. ...	Do. do.	One of eight contained b. coli communis; one of eight contained another kind of b. coli, probably b. Gaertner.
125	Do. ...	Do. do.	Two of eight contained b. coli commnnis and the spores of b. enteritidis sporogencs.
126	Emsworth ...	Oysters received from Medical Officer of Health for Portsmouth, originally from Mr. Kennott's pit at Emsworth.	Six out of 10 have b. coli communis; four others have coli-like microbes. Half of them have spores of b. enteritidis sporogenes.
127	Do. ...	Cockles do.	Nine of 10 cockles have b. coli communis; the tenth has other b. coli. Half have b. enteritidis sporogenes.
128	Do. ...	Nine oysters do. (remaining portion of samplo 126).	Six out of eight oysters contained b. coli communis; one other oyster contained a b. coli but not b. coli communis.
129	River Swale, South Deep Channel	12 oysters. Sample from bag of oysters No. 1, seized by Dr. Collingridge.	Six of these 12 oysters contained b. coli commnnis; one other oyster contained bacillus coli, resembling the bacillus of Gaertner.

130	River Swale, South Deep Channel ...	12 oysters. Sample from bag of oysters No. 2	Two of the 12 oysters contained the bacillus coli communis; four others contained b. coli, belonging probably to the Gaertner group.
129a	River Swale, South Deep	French oysters and mud ...	One out of 12 oysters has something like b. coli in small numbers. None has spores of b. enteritidis sporogenes. Mud: "Not at all bad; its smell was that of seaweed; bacterioscopic analysis shows it to be about the same as most sea mud."
130b	River Swale, Peg Fleet	Do.	11 out of 12 oysters have b. coli communis in abundance. The twelfth has some b. coli, six have spores of b. enteritidis. Mud: "Inclined to consider this as almost equal to sewage, or manure slightly diluted."
131	River Swale, Main Channel	Natives	Four out of 11 oysters have b. coli communis; two others have some kind of b. coli. None has spores of b. enteritidis sporogenes.
132	Cleethorpes	American oysters from layings ...	Five out of eight oysters contained b. coli communis in numbers. 62 per cent. polluted.
133	Do. ...	Deep Sea oysters do.	Four out of eight oysters contained b. coli communis in numbers. 50 per cent. polluted.
134	Do. ...	American oysters do.	Three out of eight oysters contained b. coli communis. One other oyster contained some other kind of b. coli. 38 per cent. polluted.
135	Do. ...	Do. do.	Two out of eight oysters contained b. coli communis. Two others had some other kind of b. coli. 25 per cent. polluted.
136	Do. ...	Do. do.	Five out of eight oysters contained b. coli communis in numbers. One other oyster contained some other kind of b. coli. 62 per cent. polluted.
137	Do. ...	Dutch Natives do.	Four out of eight oysters contained b. coli communis in numbers. Three other oysters had some other kind of b. coli. 50 per cent. polluted.
138	River Orwell	Natives from layings opposite Shotley Point.	Four out of eight oysters have b. coli communis in numbers. Two other oysters have some other kind of b. coli. 50 per cent. polluted.

139	River Orwell	Natives from layings opposite Crane's Hill.	Three out of eight oysters have b. coli communis in numbers. One other oyster had some other kind of b. coli. 37·5 per cent. polluted.
140	Plymouth, Stonehouse Creek	Cornish Natives from Helford River, stored in pit.	Of 10 oysters six contain b. coli communis in numbers. One further oyster contains some other kind of b. coli in numbers. At least 60 per cent. polluted.
141	Truro ...	Natives from layings, River Ruan	Three out of eight oysters have b coli communis in nnmbers.
142	Do. ...	Natives from layings off Tregothnan Boathouse.	One out of eight oysters has b. coli communis in numbers. One other oyster has b. coli, possibly communis; one further oyster has some other kind of b. coli.
143	Do. ...	Natives from layings at Halwyn River.	One out of eight oysters has b. coli, possibly communis.
144	Menai Straits	American oysters from layings at Gallows Point.	None contained b. coli communis. One oyster contains some other kind of b. coli.
145	Do. ...	American oysters dredged from channel between Gallows Point and Beaumaris Pier.	Very small fish, very little liqnor. Three out of eight oysters contain some kind of b. coli, not communis.
146	Do. ...	Native oysters dredged from channel between Gallows Point and Beaumaris Pier.	Miserable fish, very little liquor Five out of eight oysters con tain b. coli commnnis.
147	Emsworth ...	Oysters dredged about 2½ miles from Emsworth outfalls.	Three out of ten oysters contain b. coli communis (two in nnmbers, one small in amount).
148	Hamble River	Oysters taken from layings immediately adjacent to Ferry.	Majority contain mud inside shell. Two out of eight contain b. coli communis in numbers.
149	Menai Straits	American oysters from ponds at Griffith's Crossing, near Port Dinorwic.	Two ont of eight contain b. coli commnnis in nnmbers. Three, possibly four, others contain some other kind of b. coli.
150	Do. ...	American oysters from layings on the Anglesey side of the Menai Straits (opposite Carnarvon), between villages of Newborough and Brynsiencyn.	One out of eight oysters contains b. coli communis. One other contains some other kind of b. coli.
151	Cleethorpes	Oysters from pit.	Four ont of 12 oysters have b. coli communis in numbers. Three other oysters have some kind of b. coli; of these three oysters, in two the microbe is probably b. coli communis. Four out of six oysters examined in the particular direction have abundanco of streptococci.
152	Leigh... ...	Cockles purchased by Sanitary Inspector, Gravesend.	Interior of every one of the cockles grossly polluted. Every one contains immense numbers of b. coli and streptococci.

153	River Exe, Exeter	Mussels from Starcross and Lympstone layings, taken from a consignment at Billingsgate Market.	12 mussels examined; all have b. coli communis in numbers. Six mussels specially examined have streptococci. Of four mussels specially examined, three have the spores of b. enteritidis sporogenes.
154	Bruinisse ...	Dutch mussels taken from a consignment at Billingsgate Market.	Of 12 mussels examined, 10 have b. coli communis in numbers, one further mussel has some other kind of b. coli. Of six mussels specially examined, two have streptococci; of four mussels specially examined one has the spores of b. enteritidis sporogenes.
155	Hadleigh Ray	Mussels from layings	Of eight mussels examined, three have b. coli communis in numbers. Two others have b. coli (possibly communis). Of four specially examined, none has streptococci. Of two specially examined, none has the spores of b. enteritidis sporogenes.
156	Do.	Mussels from layings	Of eight mussels examined, seven have b. coli com. (six in numbers, one less so). Of four specially examined, none has streptococci. Of two specially examined, two have the spores of b. enteritidis sporogenes.
157	Do.	American oysters from layings	Of eight oysters examined, five have b. coli communis, three numerous, two less so. Of four specially examined, two have streptococci. Of two specially examined, one has the spores of b. enteritidis sporogenes.
158	Do.	Portuguese from layings ...	Of eight oysters examined, six have b. coli communis in numbers. Of four specially examined, none (?) has streptococci. Of two specially examined, none has the spores of b. enteritidis sporogenes.
159	Do.	French oysters from layings ...	Of eight oysters examined, three have b. coli communis—one numerous, two less so. Of four oysters specially examined, one has streptococci. Of two oysters specially examined, one has the spores of b. enteritidis sporogenes.
160	Menai Straits	Second sample American oysters from layings on Anglesey side (opposite Carnarvon), between the villages of Newborough and Brynsiencyn.	One of eight contains b. coli communis and streptococci; all others clean.

161	Southend-on-Sea	Cooked cockles from foreshore opposite HalfwayHouse. Boiled for five minutes.	Five of eight have b. coli communis, two others have some other kind of b. coli. Of four specially examined, all have streptococci.
162	Bartlett Creek, Rainham grounds	Portuguese oysters from shop in Lower Thames Street.	Four of eight have b. coli communis (three in numbers, one less so). One other oyster has some other kind of b. coli. Of four specially examined, one has streptococci. Of four specially examined, all four have spores of a gas-forming anaerobe.
163	... ...	Mussels cooked by steam, about six minutes, Billingsgate Market.	Negative.
164	Southend-on-Sea	Cockles cooked by steam, about six minutes, taken from foreshore opposite Halfway House.	Negative.
165	... ...	Mussels	Eight mussels; three have b. coli communis in numbers, three have some other kind of b. coli, and of four specially examined, none has streptococci.
166	Carlingford...	Mussels from layings	Eight mussels; two have b. coli communis in numbers, two have some other b. coli, and of four specially examined, none has streptococci.
167	...	Cockles and mussels steam cooked at Fishmongers' Hall, 27th October, 1903 :—	
	No. 1.	Cockles, top layer, 10 minutes first steaming.	All tubes without growth.
	,, 2.	Cockles, second layer, 10 minutes first steaming.	Do. do.
	,, 2A.	Cockles, from heap, second layer, 10 minutes first steaming.	Do. do.
	,, 3.	Cockles, bottom, 10 minutes first steaming.	... ...
	,, 5.	Mussels, from heap, top layer, five minutes second steaming.	Half of the tubes have growth of a sporing microbe.
	,, 6.	Mussels, from top layor, five minutes second steaming.	All tubes without growth.
	,, 7.	Cockles, from top layer, five minutes second steaming.	Do. do.
	,, 8.	Cockles, from heap, second layer, five minutes second steaming.	Do. do.
	,, 9.	Cockles, second layer, five minutes second steaming.	Do. do.
	,, 10.	Cockles, from bottom, five minutes second steaming.	... ...

168	Bartlett Creek, Rainham layings.	Portuguese	Eight oysters. Seven have b. coli communis (four in numbers, three less so); four specially examined none streptococci, four specially examined all have spores of b. enteritidis sporogenes.
169	Do. ...	Natives	Eight oysters. Five have b. coli communis (four in numbers, one less so), four specially examined one has streptococci.

Cooked cockles. Further experiments at Fishmongers' Hall.

170	(1)	Cockles washed out with boiling water 2½ minutes, then steamed 2½ minutes, 5 minutes in all at 10 lbs. steam pressure.	Out of eight cockles two contained b. coli, one other cockle some coli-like microbe.
171	(2)	Cockles steamed only for 5 minutes at 10 lbs. steam pressure.	Sterilised for b. coli and all non-sporing bacilli.
172	(3)	Cockles steamed only 2½ minutes at 60 lbs. steam pressure.	Sterilised for coli-like microbes, but not for some cocci and spores.
173	Faversham	Natives from layings half a mile east of Harty Ferry.	Eight oysters. Two have b. coli communis in numbers, one further oyster has some other coli-like microbe. Four specially examined, one has streptococci. Four specially examined, two have the spores of b. enteritidis sporogenes.
174	Do. ...	Natives do.	Eight oysters. Three have b. coli communis in numbers. Of four specially tested, one has streptococci. Of four specially tested, two have the spores of b. enteritidis sporogenes.

Cooked mussels. Further experiments at Fishmongers' Hall.

Mussels steamed at Fishmongers' Hall, 26th November, 1903, pressure of steam 8 lbs. and discharged immediately underneath the mussels.

175	("A")	Mussels from top of tray (depth of tray 2½ inches), steamed for four minutes.	Examined eight mussels of each set. None contains either coli-like or other non-sporing bacilli, none contains streptococci.
176	("B")	Mussels from bottom of tray (depth of tray 2½ inches), steamed for four minutes.	
177	("C")	Mussels from top of wire basket (basket containing about five gallons), steamed for three minutes.	
178	("D")	Mussels from middle of wire basket (basket containing about five gallons), steamed for three minutes.	
179	Bosham ...	Natives from middle of layings ...	Eight oysters. Three have b. coli communis, one further has some b. coli (query communis), none streptococci.

180	Bosham ...	Natives from Rudder Rock layings	Eight oysters. Three have b. coli commnnis, none streptococci.
181	Chichester ...	Sample of water from effluent of sewage works.	This was turbid fluid, containing over one million of microbes per 1 c. c. It had between 1,000 and 10,000 b. coli per 1 c. c. It had abont 100 spores of b. enteritidis per 1 c. c.; that is to say, this effluent compares with slightly diluted sewage, but could in no sensc be considercd as a fair effluent.
182	Burnham ...	Natives from a London shop ...	Eight oysters. One only has some kind of b. coli.
183	Seasalter & Ham Oyster Co.	Princesses from a London restaurant.	Eight oysters. Two have b. coli communis in small numbers.
184	Newport, Meedina River	Cockles	Eight cockles. Two have b. coli communis in small nnmbers, one other cocklo has some other kind of b. coli.
185	Hadleigh Ray	Portuguese	Eight oysters. Fonr have b. coli communis, one other has some other b. coli, two of four have streptococci, four have spores of b. enteritidis sporogenes.
186	West Sayville, Long Island, U.S.A.	Americans, direct *vid* Southampton.	12 oysters. Ten have b. coli communis in numbers.
187	Fleetwood ...	Americans, relaid	Eight oysters. Two have b. coli communis, two others some other kind of b. coli. None of four has b. enteritidis sporogenes or streptococci.
188	Do. ...	Mussels	Eight mussels. Three have b. coli communis, two others some other b. coli, one of four streptococci, none has b. enteritidis sporogenes.
189	Seasalter & Ham Oyster Co.	Natives from Pollard layings ...	Eight oysters. None has b. coli commnnis, one has some b. coli of other kind; of four none has streptococci, of two neither has b. enteritidis sporogenes.
190	Do. ...	Princesses from Ham layings ...	Do.
191	Do. ...	Natives from Pollard layings, southern end.	Eight oysters. One contains b. coli communis.
192	Do. ...	Princesses from Pollard layings, south-western end.	Eight oysters. Five contain b. coli commnnis in numbers.
193		Polluted Portuguese from Hadleigh Ray, relaid at Brightlingsea 17th November, taken up 29th December.	Eight oysters. Five have b. coli commnnis in numbers; of four specially oxaminod, none has streptococci; of four, two have spores of b. enteritidis sporogenes.

194		Portuguese from Hadleigh Ray (same as No. 185), relaid Brightlingsea 18 days.	Eight oysters. Seven have b. coli com. in numbers. Of four specially examined, all contain streptococci. Of three, one contains spores of b. enteritidis sporogenes, two others contain spores of some other anaerobe.
195	Holland "AH"	Oysters from De Hals layings ...	Quite clean.
196	Do. "BH"	Mussels do.	Do.
197	Holland "CH" Ijerseke	Oysters from pit	Do.
198	Holland "DH" between Ijerseke and Bergen-op-zoom	Oysters from pit	Eight oysters. One contains some acid and gas-forming microbe, but not b. coli communis; all others clean.
199	Hayling Island	Water from Cocklerythe layings	Clean.
200	Do.	Do.	Clean, but not quite so clean as No. 199.
201	Do.	Princesses from do.	11 oysters. One has a very small number of b. coli communis. Oysters quite passable.
202	Holland "EH" Bruinisse	Oysters from pit.	10 oysters. One has b. coli communis in small numbers. One has some other kind of b. coli in small numbers. Six specially examined: one has streptococci, none has spores of anaerobe.
203	Do. "FH"	Mussels from layings	10 mussels. One has b. coli communis in small numbers, and four have some other kind of b. coli. Of six mussels specially examined, three have streptococci. Of four mussels, two have spores of b. enteritidis.
204		Polluted Portuguese from Hadleigh Ray, relaid Brightlingsea 31 days (see Nos. 185 and 194).	Six out of eight have b. coli communis, one other has some coli-like microbe. Two out of four specially examined have streptococci. One out of two specially examined has spores of b. enteritidis sporogenes.
205	Brightlingsea	Americans relaid from same layings as No. 204.	None of eight has either b. coli communis or any other coli-like microbe. None has streptococci; none has spores of b. enteritidis sporogenes.
206	Hadleigh Ray	American oysters from layings.	Of eight oysters one contains b. coli communis. One other contains some other kind of b. coli. Of four oysters none has streptococci. Of two oysters none has spores of b. enteritidis sporogenes.

207	Bosham	Solent Natives from Chichester Channel and relaid in pit at Mud Creek.	Of nine oysters one contains b. coli in very small numbers. None has streptococci. None has spores of enteritidis sporogenes.
208	River Swale	Natives from layings two miles off Queenborough.	Of nine oysters examined, one has b. coli in small numbers, closely related to b. coli communis. Of four specially examined none has streptococci. Of four none has spores of b. enteritidis.
209	Penryn River	Oysters taken from lower grounds.	Of 10 oysters three have b. col. communis in numbers. Two others have some other kind of b. coli. Of four oysters specially examined, one has streptococci. Of two specially examined, one has spores of an anaerobe. (B. enteritidis?)
210	Do.	Oysters taken from bar layings ...	Result after 48 hours' incubation:— Of 10 oysters one had b. coli communis in numbers. One has b. coli communis in very small numbers. Two have some other kind of b. coli. One has some acid and gas-producing coli-like microbe in small numbers. One of four has streptococci in numbers. One other has few streptococci. One of two has spores of b. enteritidis sporogenes.
211	Helford River	French, relaid from layings in Penryn River (see sample 118) and relaid for 21 days in Gillan Helford River.	None of the tubes showed any growth after 48 hours' incubation.
212	Seasalter & Ham Oyster Company	Oysters from a London restaurant.	Of eight oysters none had b. coli communis; four had growth but not coli-like; one had growth of some coli-like microbe, but not b. coli communis. Of four oysters specially examined, none had streptococci.
213	Bartlett Creek	Portuguese, taken from shop in Lower Thames Street.	Of ten oysters examined only one has b. coli communis. Two have some coli-like microbes, not b. coli communis.
214	Southwick ...	Relaid Caen Bay and Portuguese oysters from pit.	Four flat oysters, all negative, quâ b. coli streptococci or b. enteritidis sporogenes. Of four Portuguese, two have b. coli communis in numbers (one of two specially examined had streptococci; one of two specially examined had b. enteritidis sporogenes). The other two oysters negative.
215	Do. ...	Portuguese oysters from layings in South Channel.	Of eight examined, three have b. coli communis in numbers. Two have some kind of coli-like microbe. None of four specially examined has streptococci. Two of four specially examined have b. enteritidis sporogenes.

216	Medway ...	Water taken off surface close to and eastward of Wallop Stone (mouth of Bartlett Creek).	This water was turbid and contained a considerable amount of earthy matter in the form of granules. (*a*) Comparatively few microbes of a general character. (*b*) No b. coli, no streptococci, no b. enteritidis sporogenes, in two c.c. "As surface water, which I take this water to be, it is bacterially quite satisfactory."
217	Hadleigh Ray	Portuguese from layings. ...	Of eight oysters five have b. coli communis in abundance; one has some coli-like microbes, two have no coli-like microbes. Of four oysters specially examined two have streptococci. Of two oysters specially examined neither has spores of b. enteritidis sporogenes.
218	Do.	Mussels from layings.	Of eight mussels seven have b. coli communis in abundance. Of four specially examined two have streptococci. Of two specially examined one has spores of b. enteritidis.
219	Do.	Mussels from layings.	Of eight mussels three have b. coli communis in abundance. The others negative, quâ b. coli. Of four specially examined one has streptococci. Of two specially examined one has spores of b. enteritidis sporogenes.
220	Do.	Mussels from layings.	Of eight mussels three have b. coli communis in abundance. The others negative, quâ b. coli. Of four specially examined none has streptococci. Of two specially examined neither has spores of b. enteritidis sporogenes.
221	Seasalter & Ham Oyster Company	Natives from the Pollard grounds	Of eight oysters four have b. coli communis in numbers. Of four specially examined, one has streptococci. Of two specially examined, none has the spores of b. enteritidis.
222	Do.	Natives from outer Native grounds	Of eight oysters one has b. coli communis of a kind not quite typical, one other has some other kind of b. coli. None of four has streptococci; neither of two has spores of b. enteritidis.

223	Southend ...	Water taken from the surface of the water at the west sido of Southend Pier, and at about 20 yards from the end of the Old Pier in a south-westerly direction.	The water was turbid, and contained a large amount of suspended matter. The bacterioscopic analysis showed:—(1) The water contained over 13,000 bacteria per 1 cubic centimetre. (2) The water contained over 1,000 b. coli communis per 1 c.c. (3) The water contained over 1,000 streptococci per 1 c.c. From this analysis it is clear that the water is strongly polluted with sewage.
224	Do. ...	Mussels from a boat off Southend Pier, which had been gathered from the end of the Old Pier, Southend.	Seven of nine contained b. coli communis in abundance. One mussel contained per 1 drop of contents of intestine two colonies of b. typhosus, or at any rate a microbe which in morphological and cultural respects and in agglutination is indistinguishable from the true b. typhosus.
225	Do. ...	Water taken from near the surface of the water in the swatch, and at a distance of about 30 yards to the west of the western outfall of Southend-on-Sea.	The water was turbid, and contained numerous fine particles in suspension. The bacterioscopic analysis showed:—(a) The water contained a relatively small number of microbes, about 180 per 1 c.c. (b) The water contained 10 b. coli communis per 1 c.c. (c) The water contained no streptococci per $\frac{1}{10}$th c.c. (d) The water contained no spores of b. enteritidis per 1 c.c. From this it follows that the water as sea water taken from near the shore is quite passable, and cannot be considered as polluted.
226	Falmouth ...	Natives taken from near Green Bank Pier.	Of ten oysters examined, seven have b. coli communis in numbers. Of four oysters specially examined, three have streptococci in numbers, one doubtful. Of two oysters specially examined, both have spores of b. enteritidis sporogenes.
227	Mumbles ...	Oysters from "Perches" ...	... Of nine oysters, none has b. coli communis. One has small number of some coli-like microbes. None has streptococci. None has the spores of b. enteritidis sporogenes.
228	Do. ...	Oysters from "Perches"	... Of eight oysters, two contained b. coli communis in small numbers. Of four specially examined, one contained streptococci. Of four specially examined none contained b. enteritidis sporogenes. The two oysters which contained b. coli com. were found abnormal, their substance brownish and somewhat shrivelled. No fluid within the shell.

229	River Orwell	Cockles and mud taken at a point a little higher than and on the opposite side of the Ipswich sewage outfall.	(a) Cockles. Examined the stomach only of ten cockles with this result:—4,000 to 4,800 b. coli per cockle, 800 sewage vibrios per cockle, 400 bacillus typhosus (?) per cockle. (b) Mud. Between 100 and 1,000 b. coli per gramme. Between 10,000 and 1,000 streptococci per gramme. Between 100 and 10 spores of b. enteritidis per gramme. It appears from this that while the mud is distinctly and grossly polluted with sewage, the stomach of the cockles contains and has taken up from the mud an enormous number of sewage microbes.
230	Langstone Harbour	Natives from about midway between the "Ferry" and the "Sword Sand." The distance from the area whence the oysters were dredged and Portsmouth sewer outfall was roughly estimated at 600 yards	Of nine oysters five have b. coli communis in numbers. A sixth has a limited number of b. coli communis. Of two specially examined both have the spores of b. enteritidis sporogenes. Of four specially examined two have streptococci.
231*	River Orwell	Water taken opposite Shotley Marshes at 4.50 p.m.; depth of water not less than 3 fathoms.	1. Contained 80 bacteria per 1 c.c. 2. It contained b. coli per 1 c.c., but not per 1/10 c.c. 3. It contained no streptococci per 1 c.c. 4. It contained no spores of anaerobes per 10 c.c.
232*	Do.	Water taken from the east point of Colliper at 5.30 p.m.; depth of water not less than 3 fathoms.	Contained 520 bacteria per 1 c.c. In all other respects it is just like sample No. 231. Nos. 231 and 232: both samples contained a moderate amount of suspended matter. Neither of these waters can be considered as polluted with sewage.

* In each case the bottle was weighted and allowed to rest upon the bottom of bed, consequently the water taken should be that immediately flowing over the oysters. High water at Harwich 12 o'clock noon and a spring tide.

233	Langstone ...	Solent Natives taken from the New Milton Oyster Fishery.	Of 10 oysters examined, none has b. coli communis. One has some coli-like microbes. Of four oysters, none has streptococci. Of two oysters, both have spores of b. enteritidis sporogenes in small numbers.
234	Langstone ...	Solent Natives taken from the New Milton Oyster Fishery.	Of 10 oysters, none has b. coli communis, or any other coli-like microbe. Of four oysters, none has streptococci. Of two oysters one has small number of spores of some anaerobe.

235	Warsash ...	Solent Natives taken from ponds on foreshore.	Of 10 oysters examined none contains b. coli communis. One contains some coli-like microbe, not b. coli communis. Of four specially examined none contains streptococci. Of four specially examined none contains spores of b. enteritidis sporogenos.
236	Sheppey Island	Cockles obtained from a Leigh cockler at Billingsgate Market, stated to have been steamed in an oven steamer for 5 minutes. Fished off Sheppey Island, Whitstable side, and relaid for a short time—part of tide—in Leigh water.	Of nine cockles three contain b. coli communis. Of four specially examined three have abundance of streptococci.
237	Do. ...	Cockles. All particulars same as above, No 236, with the exception, steamed in a retort, and presumably subject to greater steam pressure.	Of nine cockles one has b. coli communis. Of four specially examined one has streptococci.
238	Leigh-on-Sea	Cockles taken from two vendors at Billingsgate Market. Fished from Laysdown Flats, Whitstable, relaid in Leigh Creek for two hours, steamed in a "retort" for five minutes.	Out of eight cockles seven have abundance of b. coli. Of four cockles specially examined all have abundance of streptococci.
239	Do.	Cockles taken from two vendors at Billingsgate Market. (1) fished from the Main, alongside the Racing Channel, four miles below Burnham, relaid for 24 hours in Leigh Creek, steamed in ovens for five minutes. (2) fished from Laysdown Flats, Whitstable, relaid for two days in Leigh Creek, steamed for five minutes.	Out of eight cockles all have abundance of b. coli. Of four cockles specially examined all have abundance of streptococci.
240 and 241	Leigh Creek	Cockles taken out of Leigh Creek, in which place they had been for four days, and must needs therefore have been thoroughly polluted. The cockles were then prepared in two ways—Sample 240 being placed in a tray, put in oven and steamed for five minutes. Sample 241 was cooked in a retort for five minutes, the retort holding two baskets, each basket accommodating 2½ gallons. All the cockles were steamed at a pressure of over 10 lbs. It is to be noted that the cockles were cooked in the same way as the fishermen assert that they always prepare their wares, viz., steaming for five minutes at a pressure of 10 lbs.	The two samples of "cooked" cockles were tested, but the contents of their stomachs yielded no growth, neither coli bacilli nor streptococci were present in a living state, in fact the culture tubes remained sterile.

242	Carlingford	Natives taken from edge of western side of Channel, at a point almost opposite Warren Point Quay.	Of eight oysters one contained b. coli communis in numbers. Of four specially examined one contained streptococci of some kind. Of two specially examined none contained spores of b. enteritidis sporogenes.
243	Hadleigh Ray	Portuguese relaid oysters.	Of eight oysters four have b. coli communis in abundance. One further oyster has some other kind of h. coli. One of four has streptococci.
244	Falmouth ...	Oysters from pond near Green Bank Quay.	Of six oysters two contained b. coli communis (one in abundance, the other less so). Of four specially examined three contained streptococci. Of two examined specially neither contains b. enteritidis sporogenes.
245	Hadleigh Ray	American relaid oysters.	Of eight oysters none contains b. coli communis. One of them only contains some kind of coli-like microbe. Of four specially examined none contains streptococci. Of two specially examined neither contains spores of b. enteritidis.
246	Leigh-on-Sea	Cockles taken from vendor at Billingsgate Market.	Of eight cockles six have b. coli communis. Four specially examined have streptococci. Of each cockle a particle of the interior of the stomach was used for inoculation, and in over 70 per cent. this particle contained living b. coli, and in 100 per cent. contained streptococci.
247	Do.	Cooked cockles, taken from a Billingsgate vendor, fished from the main (six miles below Burnham). Stated not to have been relaid in Leigh Creek, and cooked in trays in oven for five minutes.	Of eight cockles, the stomach of four contains b. coli communis. Of four specially examined all four (stomach) contain streptococci.
248	Falmouth ...	Natives taken from spot selected for experiment in Penryn River, where they had been for 10 months, and relaid in improvised pond for about six weeks. Originally dredged from Falmouth Public Grounds.	Of eight oysters two have abundance of b. coli communis. Three others have h. coli, but not communis. Of four oysters specially examined two have streptococci. Of two specially examined one had spores of b. enteritidis sporogenes.
249		Portuguese taken from Hadleigh Ray, where they had been for about nine months (sample of which was analysed, *see* No. 243), and relaid at W. Mersea layings for 11 days.	Eight oysters examined for b. coli, streptococci and spores of b. enteritidis sporogenes. No growth in any culture tube, therefore oysters quite clean.

250	Halwyn River	Cornish oysters. Two bags of oysters received 5th January, 1906, by John Harmer, Billingsgate, from J. Gunn's Halwyn River layings. From these two bags, by permission of Mr. Harmer, 12 oysters were taken to constitute sample, *i.e.* six from centre of each bag.	Of eight oysters one has b. coli communis, one has some other coli-like (?) microbe. Of four specially examined one has short streptos. Of two specially examined neither has enteritidis spores. Result– oysters quite passable—fairly clean.
251	Hadleigh Ray	Portuguese taken from Mr. Wright's layings at Hadleigh Ray, on afternoon of 5th January, 1906, at low water. Taken from same beds as those of sample No. 243, and they had been on the grounds for about nine months.	Of eight oysters seven have b. coli communis, one other has some other coli-like microbe. Of four oysters specially examined one has streptococci. Of two oysters specially examined neither has spores of anaerobes.
252	Whitstable ...	Natives received January 9th, 1906, from Mr. Thos. Higgins, fishmonger, 65, Connaught Street, Hyde Park. Received by him from Mr. Carter (Farran & Carter, fish merchants), 85, Lower Thames Street, and stated by them to have been received from the Seasalter & Ham Oyster Fishery Company, Limited, Whitstable, on same date.	Of eight oysters six have abundance of b. coli communis. Two others have some other coli-like microbes. Of four specially examined one has streptococci. Of two specially examined neither has spores of anaerobes. Result—oysters distinctly unclean.
253	Do. ...	Natives. Eight oysters taken out of a barrel of oysters in shop of Farran & Carter, 85, Lower Thames Street, on January 12th, 1906, barrel bearing label "Selected Natives from the Seasalter & Ham Fishery Company, Limited, Whitstable," addressed to Mr. F. Gann, 11, Lower Thames Street, E.C.	Of eight oysters one has b. coli (communis ?). Of four none has streptococci. Of two neither has spores of anaerobes.
254	Falmouth ...	Natives taken on Saturday, January 27th, 1906, from Hole & Dodd's layings at Upper Point, close by Little Falmouth; relaid in Penryn river October last. In their present position they are exposed for about 3½ hours, they are bare for 2½ hours before low water.	Of eight oysters five have abundance of b. coli communis. Of four specially examined two have streptococci. I should therefore say that the oysters are decidedly unclean.
255	Saltash, Cornwall	Cornish oysters from Baxter's shop, Billingsgate, February 7th.	Of eight oysters four have abundance of b. coli communis, one other has some other kind of b. coli. Of four oysters specially examined three have streptococci. Of two oysters specially examined neither has spores of b. enteritidis sporogenes. Result—oysters not clean.

256	Penryn ...	Falmouth Natives from pit between Little Falmouth and Sailor Creek, Penryn river. Taken from Penryn layings and relaid in pit seven days. Messrs. Hole & Dodd, February 14th, 1906.	Of eight oysters two have b. coli communis, three others have some other kind of b. coli. Of four oysters specially examined none has streptococci. Of two oysters specially examined neither has enteritidis spores. Result—doubtfully clean.
257	Do. ...	Falmouth Natives taken from pit between Littlo Falmouth and Sailor Creek, Penryn river. Taken February 21st, after being relaid 15 days in above pit.	Of eight oysters three have b. coli commnnis, one has b. coli (communis ?), three others have some kind of coli-like microbes. Of four oysters specially examined nono has streptococci. Of two oysters specially examined none has spores of enteritidis. Result—donbtful.
258	Do. ...	Oysters from Mr. Mead's ground between Boyer - Cellars and Greenbank, where they had been placed in box raised off the beach for 21 days. Taken February 26th.	Of eight oysters five have b. coli communis (four in numbers, one less so). Of four speeially examined two have streptococci. Of two oysters speeially examined neither has enteritidis sporogenes. Result — oysters unclean.
259	Saltash ...	Saltash Natives taken from River Tamar, opposite Weir Point, on 9th ult.	Of eight oysters none has b. eoli communis. Two have some coli-like microbe, but not b. coli communis. None of four specially examined has streptococei. Neither of two specially examined has enteritidis sporogenes. Result—oysters clean.
260	Hadleigh Ray	Portuguese oysters taken May 9th, 1906, out of two bags of oysters forming a consignment of four bags arrived that morning at T. M. Wright's shop, Billingsgate Market, from his Hadleigh Ray layings.	Of eight oysters two have b. coli eommunis in numbers. Two others have b. coli communis in small numbers. Of four specially examined three have streptococci. Of two specially examined neither has spores of enteritidis. Result—oysters unclean.
261	Leigh-on-Sea	Cockles taken June 20th, 1906, from a hamper sent to Mr. Plumb, of tho "Haddoek Market," Billingsgate, by Meddle, a Leigh - on - Sea fisherman. Cooked by steam.	Of eight cockles five have in their stomach microbes (b. coli and coli-like bacilli) which do not survive a temperature of 158° F., therefore tho above cockles could not have been sufficiently heated, and cannot for this reason bo pronouncod safe.
262 & 263	Do.	Two samples of eockles sent 23rd June, 1906, were from two lots purchased same date; 262 from Harvey, 263 from Going, both of Leigh-on-Sea.	Eight cockles examined of eaeh sample; all eight contain in stomach microbes (b. coli and streptococci) whieh are killed by heat of 158° F., therefore neither sample of eockles has been sufficiently heated.

264	Leigh-on-Sea	Cockles taken out of a "pad" in the "Haddock Market," belonging to Axcell, Leigh-on-Sea fisherman, on 30th June, 1906. Stated to have been gathered from Maplin Sands, thence brought to Leigh Creek, where they were taken direct from the boat to the shed, and there cooked by steam for five minutes.	The bodies of these cockles have comparatively few microbes, but amongst these there are a good many b. coli and numerous streptococci. This shows that the cockles could not have been sufficiently heated, since b. coli and streptococci are killed by exposure to 70° C. (158° F.), that is 30° C. (or 54° F.) below boiling point of water. I should therefore consider these cockles as unsafe.
265	Maplins ...	Cockles taken July 3rd, 1906, from just a little beyond the Mouse Lightship.	Only one cockle contained some coli-like microbe, not b. coli communis. No streptococci. No spores of b. enteritidis sporogenes.
266	Do. ...	Water do. do.	The water contained about 4,800 general microbes per 1 c.c. It contained no b. coli in 1 c.c. It contained no spores of enteritidis in 10 c.c It contained no streptococci in 1 c.c.
267	Do. ...	Mud do. do.	It contained about 28,000 general microbes per 1 c.c. It contained no b. coli communis in 1 c.c. It contained no streptococci in 1 c.c. It contained no spores of enteritidis in 10 c.c. This analysis shows that the cockles are exceptionally clean ; that the water, as water from near the shore, is of a relatively clean character, as it contains no evidence of sewage or other filth pollution, and that the mud, as mud, from near the shore, is of a like satisfactory character.
268	Do. ...	Cockles gathered from Maplins, close to the Mouse Lightship, thence taken to Leigh, where they were cooked by steam pressure from 20 lbs. to 30 lbs. for five minutes. July 6th, 1906.	None contained b. coli, three contained streptococci,two contained cocci (staphylococci) ; cockles therefore not sufficiently heated.
269	Leigh Creek	Cockles gathered from Leigh Creek, July 6th, 1906, where they had been relaid since July 3rd. Cooked same as 268.	None contained b. coli, cocci or streptococci; three contained sporing bacillus subtilis, that is a harmless sporing microbe, the spores of which would not be destroyed even by boiling point of water in five minutes.
270	Leigh-on-Sea	Cooked cockles, obtained from Billingsgate Market, July 21st, 1906.	Of eight cockles four have b. coli communis, two have coli-like microbes. Of four specially examined one has streptococci. Result—insufficiently cooked.
271	Do.	Do. do.	All eight have b. coli communis. Of four specially examined three have streptococci. Result—as bad as if not cooked at all.

272 "A"	Maplins ...	Mud taken from a point off Black Tail Spit immediately below surface, *i.e.* where the cockles are embedded.	Has spirilla (sewage ?) per c.c. About 5,000 bacteria per 1 c.c. B. coli per 1 c.c., not per 1/10 c.c. No streptococci per 1 c.c. No sporogenes per 10 c.c.
273 "B"	Do. ...	Mud same as "A," but at a depth of about a foot.	About 5,000 to 6,000 bacteria per 1 c.c. No streptococci or spirilla per 1 c.c. No sporogenes per 10 c.c. Mud "A" has no growth per 1/20 c.c. phenol broth; mud "B" has growth per 1/20 c.c. phenol broth. On the whole I think neither sample of mud is bad, although sample mud "A" might be on account of the spirilla (supposing these are derived from sewage) considered not so good as sample mud "B."
274	Do. ...	Water taken at a distance of about 100 yards from whence the mud was taken, and from near the surface. The tide had been flowing for about an hour.	10 bacteria per 1 c.c. No b. coli and no streptococci per 1 c.c. No sporogenes per 10 c.c. *Very good.*
275	Do. ...	Water taken from a barrel in Meddle's hut, Leigh; tap water, *i.e.* Leigh's drinking water. This water was put in the barrel for the purpose of washing cockles after cooking.	17,760 bacteria per 1 c.c. B. coli per 1/20 c.c. Streptococci per 1/20 c.c. No sporogenes per 10 c.c. *Not good.*
276	Do ...	Cockles taken at a distance of about 300 yards from where mud and sample "A" water were obtained, thence taken to Leigh, where they were cooked by steam in oven for five minutes at a pressure of about 25 lbs.	Clean—sufficiently heated.
277	Leigh Creek	Cockles taken from near the bed of creek and within 200 yards of Leigh Sewage Works outfall. Relaid in this creek for about 10 days. Steamed in oven five minutes at a pressure of about 25 lbs.	Two of eight have b. coli, a third has coli-like microbes. No streptococci.
278	Maplins ...	Cockles taken from the same parcel as those constituting sample "A," but were subjected to five and a half minutes steaming at a pressure of about 25 lbs.	One of eight has b. coli. No streptos.
279	Leigh Creek	Cockles taken from the same parcel as those constituting sample "B," and were steamed for six minutes in oven at a pressure of about 25 lbs.	One of eight has b. coli. No streptos.
		(Samples 272–279 inclusive were all placed in bottles supplied from Professor Klein's laboratory.)	

280	Falmouth ...	Natives taken on August 4th, 1906, from a consignment of oysters from Falmouth to Ostend, at the Goods Station, Commercial Road, E. Six barrels and four cases of oysters on a van. Samples 280 and 281 made up from three of the six barrels. No. 282 from two of the four cases.	Of each sample oxamined 10 oysters. Each oyster contained abundanco of b. coli communis. Of each sample four were specially examined for streptococci with positive result. Of each sample two were specially examined for spores of enteritidis with positive result. Oysters grossly polluted with sewage or other filth.
281	Do.	Do.	
282	Do.	Do.	
283	Maplins ...	Cooked cockles, steamed one minute; steam then turned off and allowed one minute to cool; steam thon turned on and cooked five minutes.	Of eight cockles none has b. coli communis. Of four specially examined all havo streptococci.
284	Do. ...	Stoamed onc minute, cooled one minutc, cooked five and a half minutes.	Of eight cockles none has b. coli communis. Of four specially examined nonc has streptococci.
285	Do. ...	Steamed one minute, cooled ono minute, cooked four and a half minutes.	Of eight cockles one has b. coli (communis ?). Of four specially examined two have streptococci.
286	Do. ...	Steamed one minutc, coolod one minute, cooked four minutes.	Of eight cockles none has b. coli communis. Of four specially examined none has streptococci. Result.—Judged by above experiments, samples "B" 284 and "D" 286 have boen sufficiently heated; "A" 283 and "C" "285" not.

(The abovo four samplcs, 283–286, were taken on Tuesday, August 7th, 1906, marked "A," "B," "C," "D," direct from the Maplins, and not relaid. In sterilised bottles.)

287			
288		No samples submitted.	
289			
290	Carrick Road	Oysters dredged in the Carrick Road and laid at Turamwhere. Taken August 23rd, 1906; sent by Mr. Louis Joubert, Plymouth	Of eight oysters four have b. coli communis. Of four specially examined two havc stroptococci. Of two specially examined neither has enteritidis spores.
291	River Fal ...	Oysters dredged August 23rd, 1906. Laid at King Harry Passage (River Fal); sent by Mr. Louis Joubert, Plymouth.	Of eight oysters six have b. coli communis. Of four specially examined none has streptococci. Of two specially examined neither has enteritidis spores.
292	Carrick Road	Oystors dredged in the Carrick Road, and laid at St. Just, August 23rd, 1906; sent by Mr. Louis Joubert, Plymouth.	Of eight oysters five havo b. coli communis. Of four specially oxamined onc has streptococci. Of two specially examined neither has enteritidis spores. It therefore appears from this analysis that no certificate of "clean oysters" could be furnishod to any of these samples (290, 291, 292).

293	Leigh-on-Sea	Cockles steamed two minutes, steam shut off one minute, steamed four minutes.	(Taken August 31st, 1906.) Of each sample A, B, C and D eight cockles were examined, with the result that in none were either b. coli or streptococci discovered. From this it appears that these cockles had been sufficiently heated.
294	Do.	Cockles laid two deep in tray, steamed five minutes.	
295	Do.	Cockles steamed two minutes, shaken out of shells, steamed four minutes.	
296	Do.	Cockles steamed four minutes.	
297	Southend ...	Winkles gathered from Baxter's Southchurch Shell Fishery on September 4th, 1906.	Of ten winkles nine had b. coli communis in abundance. Of four specially examined three had streptococci. Of two specially examined neither had enteritidis sporogenes. Result—winkles unclean.
298	Do. ...	Winkles from Southend Corporation grounds, west of Pier up Crowstone. October 5th, 1906. Live winkles. Forwarded by Baxter.	All contained abundance of b. coli communis. Of four specially examined two contained streptococci. Three specially examined contained the spores of enteritidis.
299	Do. ...	Taken same date and place as No. 298. Winkles put in boiling water, when, after water had again reached boiling point, were allowed to boil for 90 seconds. Forwarded by Baxter.	None contained b. coli of any kind. None contained streptococci. (Eight fish of each sample (298 and 299) examined.)
300	Faversham Creek	Water from opposite "Shipwright's Arms," *i.e. above* the entrance to Ore Creek, just below surface. Put in Klein's sterilised bottles. Oct. 17th, 1906.	1. The water contains over 67,000 microbes per 1 c.c. 2. The water contains at least 1,000 b. coli communis per 1 c.c. 3. The water contains 100, possibly 1,000, streptococci per 1 c.c. 4. The water contains spores of b. enteritidis in 1 c.c., but not 1/10 c.c. From this analysis it follows that the water is strongly polluted.
301	Orwell Haven	Mussels gathered from Orwell Haven grounds when exposed on morning of October 21st, 1906.	Of eight mussels six have b. coli communis. Of four specially examined none has fæcal streptococci. Of two specially examined neither has enteritidis spores. The mussels are distinctly not clean.
302	Do.	Water, Orwell Haven, taken just below low water mark at 7.30 on morning of October 21st, 1906, at spring tide. Baxter & Son.	(a) This water contained over half a million general microbes per 1 c.c.; (b) it contained b. coli communis in 1/10 c.c., some other b. coli in 1/100 c.c.; (c) it contained fæcal streptococci in 1 e.c.; (d) it contained enteritidis spores in 10 c.c. Water doubtfully clean.
303 (1)	Cleethorpes	Oysters taken on October 22nd, 1906, from S. Osborne's beds, covered by two and three feet of water.	Of nine oysters all had abundance of b. coli communis. Of four specially examined all had enteritidis spores. Very unclean and strongly polluted.

304 (2)	Cleethorpes	Oysters taken on October 22nd, 1906, from S. Osborne's beds, covered by two and three feet of water.	Of eight oysters six had b. coli communis. Of four specially examined two had enteritidis spores. Oysters polluted, but less than sample No. 303.
*305 (1)	The Wash ...	Water taken on afternoon of October 19th, 1906, from different parts of the layings of Boston Deep Sea Fishing and Ice Co. Taken at full ebb.	Contains about 19,000 general microbes per 1 c.c. Contains b. coli communis in 1 c.c., but not in 1/10 c.c. Contains no fæcal streptococci per 1 c.c. Contains no spores of enteritidis per 10 c.c.
*306 (2)	Do. ...	Do.	Contains about 124,000 general bacteria per 1 c.c. Contains b. coli commnnis in 1 c.c., but not in 1/10 c.c. Contains no fæcal streptococci per 1 c.c. Contains no spores of enteritidis in 10 c.c.
*307 (3)	Do. ...	Do.	Contains about 121,000 general bacteria per 1 c.c. Contains b. coli communis in 1/10 c.c., not in 1/100 c.c. Contains no streptococcus (fæcal) in 1 c.c. Contains no spores enteritidis in 10 c.c.
*308 (4)	Do. ...	Do.	Contains about 320,000 general microbes per 1 c.c. Contains b. coli communis in 1 c.c., but not in 1/10 c.c. Contains no spores enteritidis in 10 c.c.

* From this analysis it appears that none of these waters can be considered objectionable considering they are "surface" waters, although No. 3 is inferior to the others. Nnmbers alone of general microbes in a surface water have no diagnostic significance, since most of them may be derived from perfectly harmless origin. Any raw surface water, however large the number of general microbes, which contains 10 or less than 10 b. coli communis per 1 c.c., which contains no fæcal streptococci per 1 c.c., and which contains no enteritidis spores in 10 c.c., may be considered of uuobjectionable quality, although it may not rank amongst "pure water." It will have to be borne in mind that these waters were all taken at "full ebb," therefore would contain in more striking and concentrated manner all possible impurities from shore.

309	Lochryan ...	Oysters purchased in Falmouth and relaid in Lochryan for a month. Sent on October 25th, 1906, from the Lochryan Oyster Fishery Co., Ltd.	Of eight oysters two have b. coli commnnis in fair numbers. Two others have b. coli communis in very small numbers. Of four specially examined two have streptococci. Of two specially examined one has enteritidis spores. Result—oysters not clean.
310	Hadleigh Ray	Winkles taken out of a bag before delivery to Mr. Wright on Saturday morning, 27th October, 1906, and sent to Dr. Klein uncooked. Mr. Wright says the winkles were gathered from his grounds at Hadleigh Ray.	Of eight winkles one only has a single colony of b. coli communis. Of four specially examined none has streptococci. Of six specially examined none has enteritidis spores. Result—winkles clean.
311	Ijerseke, Holland	Oysters taken out of a small barrel on Brice Bros.' premises at noon on October 29th, 1906.	Of eight oysters one has b. coli communis. Two others have some b. coli (?communis). Of four none has streptococci. Of two one has enteritidis spores.

312	Bruinisse, Holland	Oysters taken out of a small barrel on Baxter's premises at noon, 29th October, 1906.	Of eight oysters four have small number of b. coli communis. Of four none has streptococci. Of two neither has enteritidis spores. Result—neither sample (311 and 312) markedly unclean, but 311 better than 312.
313	The Wash ...	Oysters taken from the Boston Deep Sea Fishing and Ice Co.'s oyster grounds on November 2nd, 1906, situate in Wash at a distance of about 1,000 yards to the entrance of the New Cut and to the east of it. Oysters been relaid for periods varying from three to 10 weeks.	Of eight oysters five have b. coli communis. One other has b. coli (? communis). Of four specially examined one has (fæcal) streptococci. Of two specially examined one has enteritidis spores. Result—oysters not clean.
314	Windmill Creek, River Swale.	Oysters taken from Ullmann's shop, Lower Thames Street, from a box, November 28th, 1906, stated to have been remainder of purchase from Hole & Dodd." Inspector Roberts satisfied himself it was not so.	Of eight oysters five have b. coli communis. One further oyster has some other b. coli. Of four specially examined two have fæcal streptococci. Of two specially examined one has enteritidis spores. Result—oysters not clean.
315	Whitstable...	Native oysters made up of four separate parcels from premises of Whitstable Oyster Company, December 7th, 1906.	Of nine oysters two have b. coli communis in small numbers. Two others have small number of some coli-like microbe not communis. Of two specially examined one has enteritidis spores. Result—oysters fairly clean.
316	Do. ...	Oysters, "Empress," taken from Whitstable Oyster Company's premises, December 11th, 1906.	Of eight oysters none has b. coli communis. Two have some coli-like microbes. No b. enteritidis sporogenes.
317	Do. ...	Oysters obtained at Pimm's establishment. Manager informed Roberts were Gann's Whitstable Natives, December 11th, 1906.	Of eight oysters none has b. coli communis. Two have some coli-like microbes. Of two specially examined both have enteritidis spores. Result—both samples fairly clean (316) better (?) than (317).
318	The Wash ...	Oysters taken from layings of the Boston Deep Sea F. & I. Company, December 19th, 1906.	Of ten oysters nine have abundance of b. coli communis. A tenth oyster has small number of b. coli (? com.) Result—oysters decidedly unclean.
319	... ...	Dripping. B. Maddison, 208, Garratt Lane, Wandsworth, Fish Fryer, January 1st, 1907.	Result—nothing objectionable in the dripping.
320	Stranraer ...	Oysters from layings of Lochryan Oyster Fishery Company, Ltd., relaid at Stranraer, September last. Falmouth Natives, taken January 11th, 1907.	Of eight oysters six have b. coli communis in numbers. A seventh has b. coli communis few in numbers. Of two specially examined one has enteritidis spores. Result—oysters unclean.

321	River Swale	Mussels taken from Hammond's shop, January 14th, 1907. Sent from Leigh-on-Sea, but found to be from River Swale at a point situate between Faversham Creek and Milton Creek.	Of eight mussels all have b. coli communis in numbers. Of two specially tested both have enteritidis spores. Result—mussels decidedly unclean.
322	Stranraer ...	Oysters from layings of Lochryan Oyster Company, taken February 27th, 1907. Samples Nos. 322 and 323 are Falmouth Natives relaid. No. 324 Whitstable Native relaid at points suggested by the Company's Inspector.	Of eight oysters six have b. coli communis. Of two specially examined neither has enteritidis spores. Decidedly unclean.
323	Do. ...	Do. do.	Of eight oysters one has b. coli communis. Two others have b. coli communis (?). Of two specially examined neither has enteritidis spores. Slightly unclean.
324	Do. ...	Do. do.	Of eight oysters three have b. coli communis. Of two specially examined one has enteritidis spores. Is not clean.
325	Do.	Falmouth oysters relaid at Stranraer a little way north of the Scaur buoy and in the deep water. Taken at half ebb on April 1st, 1907, from Lochryan Oyster Fishery Company, Ltd.	Of eight oysters examined five contain abundance of b. coli communis. A sixth contains some other kind of coli-like microbe. Of four specially examined two contain streptococci. Of two specially examined neither has enteritidis spores. Result—oysters not clean.
326	Lochryan ...	Relaid Natives taken at low water April 11th, 1907, from Lochryan Bay, north of the Cairn Point. Lochryan Oyster Fishery Company, Limited.	Of eight oysters none contained b. coli communis. Result—oysters clean.
327	Truro ...	Oysters taken just below the layings of Mr. W. H. Gunn, jun., called Lower Bar.	Most of the oysters almost without liquor, shrunk. Of eight oysters five have b. coli communis. Of four two have streptococci. Of two neither has enteritidis spores.
328	Do.	Oysters taken from Thom's Rock, close by the Ferry.	Two or three with very little liquor, others all right. Of eight oysters four have b. coli communis. Of four one has streptococci. Of two neither has enteritidis spores.
329	Do.	Oysters taken from King Harry's Reach.	Most of them without liquor. Of eight oysters three have b. coli communis. Of four one has streptococci. Of two neither has enteritidis spores.

From this analysis it follows that sample 327 is unclean; neither 328 nor 329 are clean oysters, though the latter is less unclean than the former.

330	Truro ...	Oysters taken at low water from the entrance to Lamouth Creek, July 19th, 1907.	Of eight oysters only one has c. coli-like growth, not c. coli communis. No streptococci in four special cultures. No enteritidis spores in two special cultures. Result—oysters clean.
331	Do.	Oysters taken low water from a point immediately inside Lamouth Creek, July 19th, 1907.	Of eight oysters one has some slight coli-like growth, not b. coli communis. No streptococci in four special cultures. No enteritidis spores in two special cultures. Result—oysters clean.
332	Wivenhoe ...	Oysters, small Portuguese, taken from the edge of the water of the River Colne at Wivenhoe, August 2nd, 1907. William Bartlett.	Of six oysters five have abundance of b. coli communis. Of two specially examined both have enteritidis spores.
333	Do.	Oysters, large Portuguese, taken from the edge of the water of the River Colne at Wivenhoe, August 2nd, 1907. William Bartlett.	Of six oysters all have abundance of b. coli communis. Of two specially examined both have enteritidis spores. Result—oysters distinctly sewage polluted, therefore unfit for food in their raw state.
334	Do.	Water. This sample of water was taken on August 11th, 1907, from the gulley formed by the sewer connected with the slaughter-house, Wivenhoe.	The fluid smells very offensively, and looks like sewage. Analysis: —about three millions general bacteri per 1 c.c., 100,000 b. coli communis per 1 c.c., at least 100 enteritidis spores per 1 c.c. Result—ordinary average sewage.
335	Dunure, near Ayr	Winkles taken out of two boxes consigned to Brice, Billingsgate, from Dunure. The senders gathered the winkles seven miles from Girvan, and at a distance of one and a half miles from any human habitation. They were in the habit before despatch of storing the winkles in the water at Dunnre by the harbour. Taken August 17th, 1907.	Of eight winkles examined all contain b. coli communis. Of eight winkles examined for enteritidis spores all positive. Result — winkles decidedly unclean.
336	Bruinisse, Holland	Mussels taken from a bag in the possession of Baxter & Son, Billingsgate, the mussels having arrived from Bruinisse, Holland, at market, on September 3rd, 1907.	Of eight mussels two have b. coli; of two specially examined neither has enteritidis spores. Result—mussels passably clean.
337	Lympstone, Devon	Mussels taken from Hammond, Billingsgate, which had arrived from Lympstone, Devon.	Of eight mussels examined all have b. coli communis. Of two specially examined both have enteritidis spores. Result—decidedly unclean.
338	Starcross, Devon	Mussels taken from Hammond, Billingsgate, which had arrived from Starcross, Devon.	Of eight mussels five have b. coli communis. Of two specially examined one only has enteritidis spores. Result—not clean.

339	River Exe (Lympstone and Starcross)	Mussels from Knob Ground.	Of eight mussels all have abundance of b. coli communis. Of two specially examined both have plenty of enteritidis spores. Result – decidedly unclean.
340	Do.	Mussels from Scott's ground, off Powderham.	Of eight mussels four have b. coli communis. Of two specially examined both have enteritidis spores. Result—fairly passable.
341	Do.	Mussels from back of the ridge, opposite Lympstone.	Of eight mussels all have abundance of b. coli communis. Of two specially examined both have enteritidis spores. Result—decidedly unclean.
342	Do.	Mussels from the bottom of the ridge, opposite Courtlands.	Of eight mussels six have b. coli communis. Of two specially examined both have enteritidis spores. Result—not clean.
343	Torschelling, North of Holland	Mussels from a consignment to Allison, Billingsgate Market.	Of eight mussels three have b. coli communis, five have no b. coli. Result—mussels passable.
344	Lympstone...	Mussels collected at various points along the "back of the Ridge," opposite Lympstone, on September 28th, 1907.	Of eight mussels all have abundance of b. coli communis. Of two specially examined one has enteritidis spores. Result—mussels distinctly unclean.
345	Bruinisse, Holland	Dutch oysters taken on delivery at Baxter's out of a barrel marked "Z" from Bruinisse, October 4th, 1907.	Of eight oysters four have b. coli communis. Of two specially examined both have enteritidis spores. Result—oysters not clean.
346	Teignmouth	Mussels taken from a shop in Monument Street out of a bag stated to have come the same morning from Mr. L. Sealey, October 4th, 1907.	Of eight mussels five have b. coli communis. Of two specially examined both have enteritidis spores. Result—mussels not clean.
347	Loehryan ...	Mussels dredged from about the Seaur, October 13th, 1907.	Of these mussels only a small number were suited for analysis because dead; those that were not quite open, but not what could be called fresh and well closed, were the only ones available. Of six of these three contain b. coli communis. Of two specially examined neither had enteritidis spores. On the whole I do not think this sample a fair test, but as far as it goes, and considering that mussels are dirty feeders, I think they may be considered fairly passable.
348	Bamburgh, Northumberland	Mussels taken on October 16th, 1907, from Budle Bay Sholl Fish Farm.	Of eight mussels six have b. coli communis, a seventh probably b. coli communis. Of two specially examined one has enteritidis spores. Result—not clean.

349	Lympstone...	Mussels taken October 17th, 1907, from Lympstone, River Exe, and relaid at West Mersea for seven days.	Of eight mussels four have b. coli communis. Of two specially examined neither has enteritidis spores. Considering that mussels are by nature dirty feeders, I think the above result would show the mussels to be passable.
350	Do.	Mussels taken on November 7th, 1907, from Lympstone, River Exe, and relaid in Mr. Bean's water, West Mersea, for one month.	Of eight mussels two have b. coli communis. Two others very slightly positive. Four quite negative for all b. coli. Of three specially examined none has enteritidis spores. Result—mussels fairly good.
351	Do.	Mussels from the centre of the "Ridge," opposite Lympstone, River Exe. Taken at about 3.45, November 12th, 1907.	Of eight mussels seven have b. coli communis. Of two specially examined one has enteritidis spores. Result—mussels unclean.
352	Do.	Mnd do. do. (351 and 352 were taken with the object of endeavouring to select an unpolluted area upon which the Lympstone and Starcross mussels can be relaid to purify themselves.)	*Mud.*—The bottle of mud-brown sand contained about 380 grammes of sand, and on top about 20 c.c. of water. Well shaken up, so that these 20 c.c. of water would become charged as much as possible with the bacteria in the sand. Decanted the very turbid water and made cultures. The result of these is as follows:— (1) This water contained about 43,000 general bacteria per 1 c.c. (2) It contained 1,000 b. coli communis per 1 c.c. (3) It contained 100 streptococci per 1 c.c. (4) It contained enteritidis spores per 1 c.c. Considering that the above water (20 c.c.) of the sand contained practically the bulk of the bacteria in the sand (380 grammes), it follows that each c.c. of the water corresponds to about 19 grammes of sand, or in round figures 1 c.c. of the water contained the bacteria of 20 grammes of sand. Looked at in this light the bacterial contents of the mud would then be:— About 2,150 bacteria per 1 gramme of sand. ,, 50 b. coli ,, ,, ,, 5 streptococci ,, ,, ,, 1 spore of enteritidis per 20 grammes of sand. From this it follows that the mud cannot be considered *clean*, but none the less it is not to be rejected as grossly polluted with sewage deposit, for sand so polluted generally shows at least a result many times (50 to 1,000 times) worse.
353	Do.	Water taken from the centre of the "Ridge," opposite Lympstone, River Exe, November 13th, 1907. It was high water at Lympstone at 11.15 a.m., and the water was taken at 3.40 p.m.	(1) The water contains about 8,500 general bacteria per 1 c.c. (2) The water contains about 10, not 100 b. coli communis per 1 c.c. (3) The water contains about 10, not 100 streptococci per 1 c.c. (4) The water contains enteritidis spores in 10 c.c., but not in 1 c.c. From this analysis it follows that the water is not exactly clean, but as surface water is passable; it is about the same as, if not better than, the water of the upper Thames, *i.e.* above the intake of the Water Companies.

354	Bruinisse ...	Oysters taken from a shop in Billingsgate which had just arrived from Holland. Stated to have been taken out of pits at Bruinisse. Taken out November 26th, 1907.	Of eight oysters two contain b. coli communis, a third oyster contains some other kind of coli-like microbe. No enteritidis spores. Result—oysters fairly clean, quite passable.
355	Shoreham ...	Mussels taken on December 6th, 1907, from River Adur, close to the Norfolk Bridge.	Of eight mussels, all contained very copiously b. coli communis. All contained enteritidis spores. All contained copiously proteus vulgaris.

As mentioned in my preliminary report, a guinea-pig injected with fluid of the bodies of mussels became very ill within twenty-four hours. The exudation in the gangrenous subcutaneous tissue was crowded with a species of bacilli, which on culture proved a sporing anaerobe bacillus. The culture of this microbe itself injected into the subcutaneous tissue of another guinea-pig caused illness—great and extensive inflammation. I have not finished with this microbe yet, but this much can be said, that the above mussels contained abundance of sewage microbes, and, in addition, a sporing microbe which is distinctly pathogenic.

Report of Professor Klein, 3rd December, showing the following results of treatment of polluted mussels, viz. :—

356	Southend ...	Fresh mussels from Westcliff-on-Sea.	144 b. coli communis per mussel.
		Mussels treated for two days with clean sea water.	12 „ „ „
		Mussels treated for four days with clean sea water.	0 „ „ „
		Mussels treated for six days with clean sea water.	0 „ „ „
357	Poole Channel	Oysters relaid in Poole Channel for seven days. Dredged from opposite Saltburn Pier, in Poole Harbour, January 24th, 1908.	Of eight oysters examined seven have abundance of b. coli communis. Of two specially examined one has enteritidis spores, one doubtful. Result—oysters unclean.
358	Conway ...	Water taken January 25th, 1908, at low water from the surface, in the middle of the river, and opposite Deganwy Point.	Water 1,600 bacteria per 1 c.c. B. coli communis in 1/10 but not in 1/100 c.c. No enteritidis spores in 10 c.c. Result—water quite passable as surface water.
359 "A"	Do. ...	Mussels taken January 25th, 1908, about 50 yards above bridge at Conway and 50 yards below bridge.	Of eight mussels all have abundance of b. coli communis. Of two specially examined both have enteritidis spores.
360 "B"	Do. ...	Mussels taken January 25th, 1908, from a bank opposite Deganwy.	Of eight mussels seven have abundance of b. coli communis. Of two specially examined one has enteritidis spores.
361 "C"	Do. ...	Mussels taken January 25th, 1908, in the channel of river some 300 yards below the Deganwy outfall.	Of eight mussels seven have abundance of b. coli communis. Of two specially examined neither has enteritidis spores.

362 "D"	Conway ...	Mussels taken January 25th, 1908, at the entrance to the western channel, the remainder being taken some 500 yards higher up the said channel.	Of eight mussels all have abundance of b. coli communis. Of two specially examined both have enteritidis spores. Result—samples "A" and "D" decidedly unclean. Sample "B" not clean, but better than "A" or "D." Sample "C" not clean, but better than "B."
363 "A"	Orwell River	Oysters taken from a pit (where they had been some months) situate on the Saltings, opposite and on the Shotley side of river, January 29th, 1908.	Of eight oysters six have abundance of b. coli communis. Of two specially examined one has enteritidis spores.
364 "B"	Do.	Oysters taken January 29th, 1908, in about six fathoms of water, and at a point opposite Shotley Church	Of eight oysters five have abundance of b. coli communis. One other has some kind of b. coli, but not communis. Of two specially examined neither has enteritidis spores. Result — therefore both samples unclean, "A" more (?) so than "B."
365	Queenstown	Oysters taken February 4th, 1908, at Billingsgate Market, from Baxter & Son's premises; from Fota Island Oyster Fishery, sender being F. H. Chamberlain, of the above Fishery, Queenstown.	Of eight oysters four have abundance of b. coli communis. One other has few b. coli communis. Three have none. Of two specially examined one has enteritidis spores. Result—oysters not clean.
366	Cancale (Ile Villaine) ...	Oysters from Mr. Saunion's shop, taken March 28th, 1908.	Of eight oysters five have b. coli communis. Of two specially examined neither has enteritidis spores. Result—not satisfactory.
367	North Dutch	North Dutch oysters bought at T. M. Wright's shop, April 7th, 1908; stated to have been received from North Holland.	Of six oysters three have b. coli communis. (two abundantly; one less so). Of two specially examined neither had spores of enteritidis. Result—oysters not clean.
368	Bamburgh, Northumberland	Mussels taken from Budle Bay Fish Farm, May 21st, 1908.	Of eight mussels five had b. coli communis. Of four specially examined no enteritidis spores.
369	Conway ...	Mussels taken from the shore near Penmaenbach Well, upon the beach under Morfa Range, on June 3rd, 1908.	Of eight mussels six have abundance of b. coli communis. Of two specially examined both have enteritidis spores. Result—mussels unclean.
370	Do. ...	Mud do. do.	One gramme of mud contains over one million bacteria. One gramme mud contains about 10,000 b. coli communis. One gramme mud contains about 100 but not 1,000 enteritidis spores. Result—mud distinctly unclean.

371	Conway	...	Water taken from the shore near Penmaenbach Well, npon the beach under Morfa Rangc, on June 3rd, 1908.	This contains 1,000 bacteria per 1 c.c.; it contains b. coli communis in 1 c.c., but not in 1/10 c.c. It contains no enteritidis spores in 10 c.c. Result—water qnitc passable.
372	...	...	Shrimps analysed by Dr. Hurtley, for preservative, taken at Billingsgate Market, July 16th, 1908.	No trace of any preservativc found except a very doubtful indication of boric acid.
373	...	...	Do. do.	This sample yielded clear evidence of the presence of formalin.
374	Lochryan	...	Oysters taken Jnly 22nd, 1908, ont of one of the new tanks of Lochryan Oystcr Fishery Co., where they had been relaid for three weeks, previons to which they had been dredged from Company's beds at Lochryan. Sample composed of Whitstable, Cornish, French and Lochryan Natives respectively.	Of eight oysters six have no b. coli of any kind. Two have some gas-forming nicrobe, but not acid-forming, therefore not b. coli commnnis. Of two specially examined neither has b. enteritidis sporogenes. Result—oysters satisfactory.
375	Exe ...	...	Mnssels taken August 11th, 1908, from Pole Sands, opposite Coastguard Station, Exmonth.	50 % abnndance of b. coli communis. 50 % few b. coli commnnis. 50 % enteritidis spores. No pathogenic microbe.
376	Do. ...	...	Mussels taken August 12th, 1908, from bag consigned to Baxter & Son, Billingsgate, by Scott, Powderham.	100 % abundance of b. coli communis. 100 % enteritidis spores. No pathogenic microbe.
377	Do. ...	...	Mussels taken Angust 12th, 1908, from two bags consigned to Hammond, Billingsgate, by Clapp, Lympstone.	83 % abundance of b. coli communis. 17 % few b. coli communis. 0 % enteritidis spores. No pathogenic microbe.
378	Do. ...	...	Mussels taken August 12th, 1908, out of two bags consigned to G. Tabor & Son, by Venns, Lympstone.	33 % abundance of b. coli communis. 50 % few b. coli communis. 17 % none. 100 % enteritidis sporcs. No pathogcnic microbe.
379	Conway	...	Mussels taken Augnst 20th, 1908, from the shore near Penmaenbach, under Morfa Range.	62 5% have copions b. coli commnnis. 25 % have few b. coli communis. 12 5 % have 0. 100 % have enteritidis spores (few).
380	Orwell	...	Oysters, Natives, taken ont of the "Legion," on foreshore of River Orwell, by Shotley (H. L. Cook), taken October 9th, 1908. Oysters had been in "Legion" for over a week.	Of eight oysters none has b. coli. Of four specially examined none has enteritidis spores. Result—oysters quite clean.
381	Do.	...	Water taken 10 a.m. — same "Legion" as sample 380. Water commenced to flow into "Legion" at 9 a.m. High water at Shotley about 11.30 a.m.	(a) 400 bacteria per 1 c.c. (b) B. coli per 1 c.c not per 1/10 c.c. (c) No enteritidis spores per 10 c.c. Result—as surface water quite satisfactory.

382	Conway ...	Mussels takon October 20th, 1908, high up the beach, under Morfa Range, near Penmaenbach, where they were bred and born. Low water.	There were present :— B. coli communis 30 but not 300 per mnssel. Spores of enteritidis 6 but not 12 per mussel. This result would correspond to 50 % free of b. coli in respect of previous analyses. These mussels therefore may be considered as passable.
383	North Holland	Oysters, North Dutch, stated to have been relaid at Hadleigh Ray since the previous Saturday. Taken November 12th, 1908, from Mr. T. M. Wright, Billingsgate Market.	66 % have abundance of b. coli commnnis. 100 % have enteritidis spores. "Polluted."
384	Do. ...	Do. do.	66 % have b. coli communis. 50 % have enteritidis spores. 50 % (?) have enteritidis spores. "Potentially dangerons."
385	Do. ...	Oysters, North Dntch, taken from same consignment as above, but in conjunction with Mr. T. M. Wright. Taken on November 14th, 1908.	Of eight oysters five have abundanoe of b. coli communis. By plate cultivation it is calculated that there were *over* 300 b. coli communis *per oyster*. Of four oysters specially examined all fonr have spores of enteritidis. Of four specially examined all four have streptocooci. Result—oysters distinctly polluted.
386	Ijerseke, Holland	Oysters taken November 18th, 1908, ont of an unopened barrel (marked "B A"), received by Baxter & Son, Billingsgate, on Monday, November 16th, from Mr. Jx. Willemsen, Jr., Viestraat, Ijerseke. Similar oysters to those supplied to Beckenham banqnet.	Of eight oysters examined none contains b. coli communis or any other b. coli. Of two specially examined neither contains enteritidis spores or any other anaerobes. Oysters clean.
387	American	Imported American Blue Point oysters, taken December 1st, 1908, from Mr. T. M. Wright's shop, 10, Billingsgate Market.	Of eight oysters seven quite free of b. ooli. No enteritidis spores in any. Result—oysters clean.
388 "A"	Poole ...	Taken from shop of Wm. Pierce, 50, John Bright Streot, Birmingham, on December 8th, 1908; received on December 1st, 1908, from Poole, from G. Stout, Stanley Road, Poole.	Only four oysters were available. One of three only contained few b. coli communis. One of three only contained streptococci. B. enteritidis sporogenes not present in 0·4, but present in 0·8 of an oyster. Result — oysters only very slightly polluted. No paratyphoid or typhoid microbes could be detected.

389 "B"	Poole	...	Taken from A. Hunting, 64 & 65, Strand Market Hall, Birmingham, on December 8th, 1908; received from Poole from G. Stout, Stanley Road, Poole, on December 4th.	Only seven oysters available. All have b. coli communis; one few, the others very copiously. All have streptococci enteritidis spores present per oyster. Numerous microbes were discovered per 1/20 oyster, which in the tests applied agree with the group of paratyphoid microbes, including pathogenicity for guinea-pigs. Result — oysters dangerously polluted.
390	Truro	...	Oysters taken from Mr. Beszant's shop on December 10th, 1908; part of a consignment sent from W. H. Gunn, Hillside, Malpas, Truro, Cornwall; gathered from Coombe Creek, near Turnaware Barn.	Of eight oysters five have abnndance of b. coli communis. One has fair number b. coli communis; one has few b. coli communis. This would calculate to abont 100 b. coli communis per oyster. All have streptococci. Enteritidis spores two per oyster, not four. Numerous microbes were present per 1/20 oyster, which microbes belong to the group of paratyphoid. Result therefore is — oysters dangerously polluted.
391	Truro	...	Oysters taken out of a bag December 22nd, 1908, newly opened, and well down the bag; consigned to Baxter & Son, Billingsgate, by J. Gunn, Coombe Kea, who guaranteed them to have been relaid in Lamouth Creek.	Of eight oysters three have some b. coli communis. Of three specially examined none has enteritidis spores. Result—oysters passable.
392	Do.	...	Oysters taken from Coombe Creek, where Mr. H. Gunn stated they were relaid for three weeks.	Of eight oysters six have b. coli communis. A seventh has some kind of b. coli (communis ?). Of two specially examined one has enteritidis spores. Result—oysters not clean.
393	Do.	...	Oysters taken from the entrance to Lamouth Creek, where they had been for about six months.	Of eight oysters three have b. coli communis. Three others have some kind of b. coli (communis?). Of two specially examined neither has enteritidis spores. Result—questionably clean.
394	Swale	...	Oysters taken from a bag on the floor of Mr. Ullmann's shop, New Broad St., January 1st, 1909; stated to have reached the shop the same morning. Ullmann states they come from Elmley layings in Swale.	Four, but not eight, b. coli communis per oyster. Two, but not four, enteritidis spores per oyster. No pathogenic intestinal microbes, that is, gaertner-paratyphoid.
395	Do.	...	Oysters taken out of the window of Mr. Ullmann's shop, New Broad St., January 1st, 1909; stated to have reached the shop the previous day. Ullmann states they come from Elmley layings in the Swale	20–40 b. coli communis per oyster. Two, not four, enteritidis spores per oyster. Result— Decidedly polluted. No pathogenic intestinal microbes, that is, gaertner-paratyphoid.

396	Ardfry, co. Galway	Oysters taken January 4th, 1909, from Mr. D. J. Mooney's layings at Ardfry, co. Galway, where the Department of Agriculture and Technical Instruction, Iroland, have an experimental oyster station. Sent by instructions of E. W. L. Holt.	Of eight oysters none contains b. coli commnnis. Of two specially examined one has enteritidis spores. Result—clean.
397	Swale ...	Oysters taken from Ullmann's oyster layings in River Swale, known as Elmley layings, January 20th, 1909.	Of eight oysters examined two have few b. coli communis. Two others have some b. coli, but not typical commnnis; four negative. Of two specially examined neither has enteritidis spores. Result—oysters passable.
398	Stangate Creek	Portuguese oysters taken out of an nnopened sack in Hole & Dodd's shop, Monument Street, January 23rd, 1909; stated to have come from firm's layings known as Stangate Creek.	Of eight oysters examined all contain b. coli commnnis; six copiously, two less copiously. Of two oysters specially examined neither contains enteritidis spores. Result—oysters not clean.
399	Whitstable ...	Oysters taken on 27th February, 1909, from "Trocadero," Seasalter and Ham Oyster Fishery Co.	Of eight oysters seven have abnndance of b. coli communis. Of four specially examined all have streptococci. Of two specially examined both have enteritidis spores. Result—Oysters decidedly unclean.
400	Do. ...	Oysters taken 2nd March, 1909, Gann's shop in Lower Thames Street (Seasalter and Ham).	Of eight oysters one has b. coli communis in numbers. One other has b. coli (communis?) in very small numbers. Six are free of any b. coli. Of four specially examined none has streptococci. Of two specially examined neither has enteritidis spores. Result—oysters passably clean.
401	Do. ...	Oysters — Whitstable Natives, taken 2nd March, 1909, from Seasalter and Ham Grounds.	Seven of eight have b. coli communis. Three of four special have streptococci. Of two special both have enteritidis spores. Result—oysters not clean.
402	Do. ...	Oysters — Whitstable Natives, taken 9th March, 1909, Pollard layings (Seasalter and Ham.)	Of eight oysters five have no b. coli of any kind; two have b. coli communis; one has some few b. coli, not commnnis. Of four specially examined none has streptococci. Of two specially examined one has enteritidis spores. Result—oysters passable.
403	Do. ...	Whitstable Natives, Seasalter and Ham, taken 9th March, 1909.	Of eight oysters six have no b. coli of any kind; two have few b. coli communis. Of four specially examined none has streptococci. Of two specially examined one has enteritidis spores. Result—oysters fairly clean.

404	Whitstable ...	Oysters taken 9th March, 1909, from Faversham dredgermen's ground at Whitstable	Of six oysters five have no b. coli of any kind; one has some few b. coli communis. Of three specially examined none has streptococci. Of two specially examined one has enteritidis spores. Result—oysters clean.
405	Do. ...	Water taken from No. 402, March 9th, 1909.	1/100 c.c. } No b. coli of any kind. 1/10 c.c. } 1 c.c. }
406	Do. ...	Water taken March, 1909, from "Outer Half, Ware."	No streptococci per 1/100 c.c. No streptococci per 1 c.c. No enteritidis spores per 7 c.c. No bacteria per 1/100 c.c., *i.e.* if any less than 100 per 1 c.c. Result—waters clean.
407	Do. ...	Water taken 12th March, 1909, from rinsing main of Water Company's water, Whitstable.	Water quite clean. It contains no bacteria in 1/100 c.c., that is to say: if any, it contains less than 100 per c.c. 1/100 c.c. } No b. coli of any kind. 1/10 c.c. } 1 c.c. } No streptococci in 1 c.c. No enteritidis spores in 10 c.c.
408	South Holland	Taken 16th March, 1909, from barrel at "Trocadero," supplied by Whitstable Oyster Co.	Of eight oysters three have b. coli communis. Of four specially examined none has streptococci. Of two specially examined neither has enteritidis spores. Result—oysters passably clean.
409	Do.	Do.	Of eight oysters five have b. coli communis. Of four specially examined one has streptococci. Of two specially examined neither has enteritidis spores. Result—oysters doubtfully clean.
410	Poole	Oysters taken March 19th, 1909, by M. O. H., Taunton, from Burbidge, of Poole.	Of eight oysters five have abundance of b. coli communis. Two others have b. coli communis, but not so numerously. Of four oysters specially examined three have streptococci. Of two specially examined neither has enteritidis spores. Result—oysters not clean.
411	Do.	Mussels taken 21st March, 1909, from Studland Bay.	Of eight mussels six have numerously b. coli communis. Of four specially examined one has streptococci. Of two specially examined one has enteritidis spores. Result—mussels doubtfully clean.
412	South Holland	Oysters taken March 25th, 1909, from Whitstable Co.'s depôt, Fish Street Hill. Vlissingen.	Of four specially examined one only showed streptococci. Of two specially examined neither has enteritidis spores. Of eight oysters four only showed very few b. coli communis. Result—oysters passable.

413	Milton Creek	Oysters purchased at shop, Milton Road, Sittingbourne, April 1st, 1909, stated to have been taken from mouth of Milton Creek.	Of eight oysters three have some b. coli commnnis. Of four specially examined none has streptococci. Of two specially examined one has few enteritidis spores. Result—oysters passable.
414	Swale ...	Water taken on May 7th, 1909, at 6.30 a.m., in Swale, about 100′ S.S.W. of Ham Gat Buoy.	(*a*) The water contains 100 but not 200 bacteria per 1 c.c. (*b*) The water contains no b. coli commnnis per 1/100 c.c. and per 1/10 c.c. (*c*) The water contains b. coli commnnis per 1 c.c. (*d*) The water contains no enteritidis spores per 100 c.c. Result—water satisfactory as surface water.
415	Do. ...	Oysters dredged at western extremity of layings, *i.e.* a quarter of a mile from Elmley Ferry; taken May 12th, 1909.	Of eight oysters seven have b. coli communis. Of these seven oysters three have b. coli communis fairly copiously; two have b. coli communis moderately; two have b. coli communis (very few). Of four specially examined two have streptococci. Of two specially examined neither has enteritidis spores. Result—oysters not clean.
416	Do. ...	Oysters dredged from eastern extremity of Elmley Ferry layings, May 12th, 1909.	Of seven oysters six (?) have b. coli communis. Of these six oysters two have b. coli communis fairly copiously; two have b. coli commnnis moderately; two have b. coli communis (very few) (?). Of four specially examined none has streptos. Of two specially examined neither has enteritidis change. Result—oysters not clean (?), but better than 415.
417	Southend-on-Sea	Cooked cockles purchased 28th May, 1909, from Southend Shell Fish Co., at their shed situate on foreshore, in close proximity to "Half-way House," at Southend-on-Sea.	(1) These cockles are distinctly polluted and insufficiently cooked, because even in the cooked condition they contained: (*a*) More than 20 b. coli communis per cockle; (*b*) more than 20 streptococci per cockle. (2) As to pathogenicity:—These cockles contained per 1/20 part nnmerous microbes, which appear to belong to distinctly pathogenic coli-like microbe.
418	Medway ...	Native oysters taken from West Hoo Creek, River Medway, 2nd June, 1909, about 4.30 p.m.	Of eight oysters two have b. coli communis. Of four specially examined none has streptococci. Of two specially examined neither has enteritidis spores. Result—oysters passably clean.
419	Swale ...	Native oysters taken from Queenborough Fishery Trust layings, opposite Codds Creek, in Long Reach, River Swale, June 3rd, 1909.	Of eight oysters six have abundance of b. coli communis. Of four specially examined two have streptococci; one other doubtful. Of two specially examined one has enteritidis spores. Result—oysters not clean.

420	West Hoo Creek ...	Portuguese oysters taken by Mr. J. Pullen, 14th June, 1909, from his layings at West Hoo Creek.	Of eight oysters seven have b. coli communis—six abundantly, one few. Of four specially examined three have streptococci. Of two specially examined one has enteritidis spores. Result—oysters not clean.
421	Whitstable	Water taken from Ham Fishery and from Markets Ground known as Outer-half Ware, June 19th, 1909.	(1) Less than 100 microbes per 1 c.c. (2) No. B. coli of any kind in 1/100 or 1/10 c.c. (3) No streptococci in 1/100 or 1/10 c.c. (4) No enteritidis spores in 10 c.c. Result—water quite satisfactory.
422	Do. ...	Oysters dredged from same place as No. 421, June 19th, 1909.	Of eight oysters none has b. coli communis. Of four specially examined none has streptococci. Of two specially examined both have enteritidis spores. Result — oysters satisfactorily clean.
423	Do. ...	Water taken from Pollard Native Ground, June 19th, 1909.	(1) Less than 100 microbes per 1 c.c. (2) No b. coli and not streptococci per 1/100 c.c. (3) B. coli per 1/10 c.c. not per 1/100 c.c. No streptococci per 1/100 or per 1/10 c.c. (4) No enteritidis spores per 10 c.c. Result—water satisfactory as surface water.
424	Do. ...	Oysters dredged from same place as 423, June 19th, 1909.	Of eight oysters one had some kind of b. coli. Of four oysters none had streptococci. Of two specially examined one had enteritidis spores. Result—oysters clean.
425	Do. ...	Oysters dredged off grounds by Whitstable Oyster Co., June 19th, 1909. Taken from Brittany ground, south-east of Market beds, part nearest Whitstable Drainage Outfalls.	Of eight oysters none has b. coli communis. Of four oysters none has streptococci. Of two oysters specially examined one had enteritidis spores. Result–oysters satisfactorily clean.
426	West Hoo Creek ...	Portuguese Oysters from Mr. Pullen—West Hoo Creek, June 28th, 1909. Had been placed in trays for upwards of 21 days, and previously taken from Top Reach, just below Middle Crank, from clean stony ground.	Of eight oysters examined all eight have copiously b. coli communis. Of four oysters specially examined all four have streptococci. Of two oysters specially examined both have enteritidis spores. Result—oysters unclean.
427	Swale ...	Native oysters dredged low water close to Codd's Creek in Long Reach, West Swale, June 28th, 1909.	Of eight oysters examined three have b. coli communis in numbers, one other has b. coli few in numbers, four have no b. coli of any kind. Of four oysters specially examined none has streptococci. Of two specially examined one has enteritidis spores. Result—questionably clean.

Appendix.

SEWAGE CONTAMINATION OF SHELL FISH.

QUESTIONS SUBMITTED TO PROFESSOR KLEIN, M.D., F.R.S., AND HIS ANSWERS THERETO.

QUESTIONS.	ANSWERS.
1.—Whether the presence of bacillus coli communis is absolute proof of sewage pollution?	1.—No; the presence of bacillus coli communis in small numbers, and only in a few of many oysters of a particular bed, is no absolute proof of sewage pollution, because these few microbes may have by chance found their way to the bed from occasional excremental matters of man or animals from a field or adjoining land.
2.—Whether the presence of bacillus enteritidis sporogenes in addition to the above indicates a higher state of pollution?	2.—The presence in oysters of the spores of bacillus enteritidis in addition to the bacillus coli communis does not necessarily indicate a higher state of pollution. The presence of bacillus coli communis means recent pollution. The presence of the above spores, which are highly resisting, may be of some standing, and may have been in the bed some time ago. The presence of the spores in the oysters besides the bacillus coli communis would therefore indicate, not only recent pollution, but also that such pollution may have been going on for some time.
3.—If the bacillus streptococci is also present, what does it indicate?	3.—Streptococci (chains of *cocci*, they are not of the shape of rods like the *bacilli*, but are made up of a linear series of spherical microbes), mentioned repeatedly in my analyses, occur in excremental matters, and, of course, also in sewage; but they are far less numerous than the sewage bacillus coli communis. In ordinary domestic sewage the number of bacillus coli communis is between 100,000 and 1,000,000 per 1 cubic centimetre, or, in other words, between 6,500 and 65,000 in each drop, whereas in the same kind of sewage the number of streptococci is a hundred times (about) less. It does not follow, therefore, that when bacillus coli communis is present in an oyster also streptococci should be there; but when these latter are present in the oyster in addition to the bacillus coli communis, it is strong confirmation that that oyster has been exposed to excremental pollution.
4.—In what articles of food and drink is the bacillus coli communis found?	4.—Bacillus coli communis occurs in articles of food and drink (water, milk) which have been either directly polluted with filth sewage, manure and excremental matters, or which have indirectly, through previously polluted utensils, dirty hands, street filth, &c., been exposed to filth pollution.

QUESTIONS.	ANSWERS.
5.—Is any of the above coli dangerous if partaken of in food?	5.—The group of bacillus coli comprises a number of species and varieties. Some, like the typical sewage bacillus coli communis, may be perfectly harmless when tested on animals. But there are some varieties and species belonging to this group of microbes which are distinctly harmful to man, causing acute gastro-intestinal disease of different nature. These harmful bacillus coli appear in morphological and cultural respects to be placed somewhere between the bacillus coli communis and the bacillus typhosus, some being nearer the former, others nearer the latter. To this group belong the poisonous ice-cream bacillus coli; the bacillus coli which is the cause of beef poisoning, sausage poisoning and other meat poisoning (bacillus gaertner); the bacillus paratyphosus; the bacillus dysenteriæ, causing various forms of diarrhœa (including, probably, autumnal diarrhœa of children) and dysentery. All these harmful bacillus coli and *coli-like* microbes cause by their multiplication within the alimentary canal the intestinal disorder, and therefore pass out with the excrement into sewage.
6.—If not, would the bacilli in combination be dangerous?	6.—I am distinctly of opinion, supported by experimental evidence which I have obtained in special work during the last year, that the introduction into the animal system of some of the pathogenic bacillus coli, either simultaneously with or antecedent to the introduction of the bacillus typhosus, enhances the action of the latter and increases the predisposition and susceptibility of the organism to infection. This is also quite in harmony with clinical experience *re* typhoid fever.
7.—If any or either of them is in small quantities not dangerous, in what percentage would they, in your opinion, become so?	7.—This question cannot be answered, because there are no exact data available, but, stated in general terms, the probability is that the larger the dose the sooner and the more distinct the pathogenic result.
8.—Would you consider an oyster showing over 25 per cent. of bacillus coli communis unfit for food?	8.—A sample of oysters, of which 25 per cent. of the oysters contain bacillus coli communis, need not *per se* be unfit for food, although I should consider them unsafe if the 25 per cent. contained the bacillus coli in numbers, and if this result were obtained on analysis of the oysters of the same bed on more than one occasion, I should then say that these beds have most probably been exposed to sewage, and by implication may contain some harmful microbe.
9.—If you consider they are practically harmless would you, before giving a decided opinion, require to know the physical condition of the beds, &c.?	9.—As stated just now, and under the conditions mentioned, I should most certainly, before giving a final decision, require to know the local conditions and surroundings. If these local conditions are of such a nature that pollution of the bed with sewage is within reach, I should consider the oysters unsafe for consumption.

REMARKS.

In my analysis I test each individual oyster separately, and from a very large number of analyses I am prepared to affirm that, always using a reasonable amount of the juices of the oyster (1/5-1/6 c.c.), oysters derived from clean beds do not contain the sewage bacillus coli communis, or if they do, they contain them either in an insignificant percentage of the sample and in very small numbers, whereas oysters taken from beds open to pollution or actually polluted contain (analysed after precisely the same method) the sewage bacillus coli communis in proportion to the amount of exposure to pollution.

10*th January*, 1904.

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